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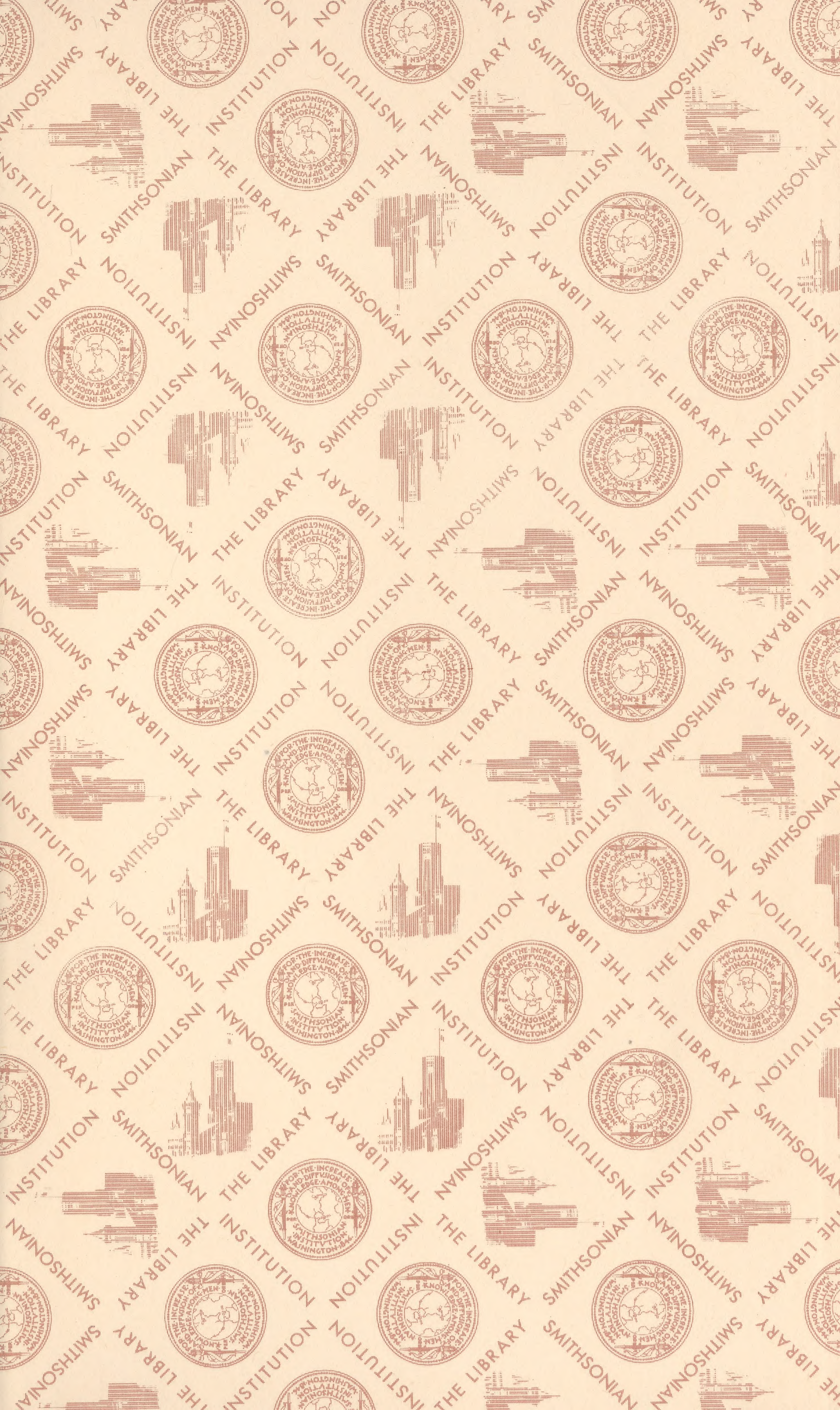

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# PLANT LIFE

## VOLUME 19

[Nos. 1-4, Jan., Apr., Jul. & Oct.]

## 1963

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California

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# CORRIGENDA

## PLANT LIFE, VOL. 18. 1962

Page iii, 3rd line, in heading "PLANT LIFE, VOLUME 18, etc.", change "1961" to "1962".

Page iv, In heading, "PLANT LIFE VOLUME 18, etc.", change "1961" to "1962".

Page 9, 18th line from top is misplaced; it should be indicated as the first line of text under "South African Travels, 1960".

Page 13, 20th line from top, change "Sept. 28" to "Sept. 22".

Page 59, Under "V. MEXICANA ALLIANCE," 3rd line, change "It" to "The species".

Page 62, under 14a, 3rd line, change "long" to "wide".

Page 66, 18th and 19th lines from top, indicate that "nel-shaped, margins erect" is to follow 20th line, "Cup 2.2 cm. long, fun-".

Page 67, under 40a, 1st line. change "cm." to "mm.".
under 40b, 2nd line, change "cm" to "mm."

## 1962 SUPPLEMENT—THE PHYLA OF ORGANISMS

Page 7, Table 2, heading of table, change "Heterplantae" to "Heperoplantae".

Page 9, 17th line from bottom, change "was" to "is".

Page 14, 6th line from top, change "millenia" to "millennia".

Page 17, footnote, 4th line, change "movemest" to "movement".

Page 18, 19th line from top, change "object" to "objective".

Page 29, 1st line of text, change "1880" to "1888".

Page 32, 5th paragraph, 2nd line, change "maintain" to "maintains".
20th line, change "are" to "is".

Page 34, under "KINGDOM III. ANIMALIA":
6th line, change "subkingdom" to "subkingdoms".
13th line, change "infraphyla: Infraphylum" to "Infrafamilies: Infrafamily".
16th line, change "Infraphylum" to "Infrafamily".

Page 35, 17th line, between "bringing" and "mouth" insert "the".

Page 37, under Superkingdom I. Autotrophae, 3rd line, change "CO2" to "$CO_2$".
under Phylum 3. Autoferrophyta, order 3, Leptothringales, Family 1, change "Leptothringscese" to "Leptothringaceae".

Page 38, 3rd line from bottom, delete "a".

Page 39, 4th line from bottom, delete "Leptothrix".

Page 41, under Infrakingdom 2. "Eumetazoe" 3rd line, change "degeration" to "degeneration".
under Phylum 28, Mesozoa, change "degerate" to "degenerate".

Page 43, 28th line from top, change "Titis" to "Titus".

[**CORRIGENDA**, continued on page 160.]

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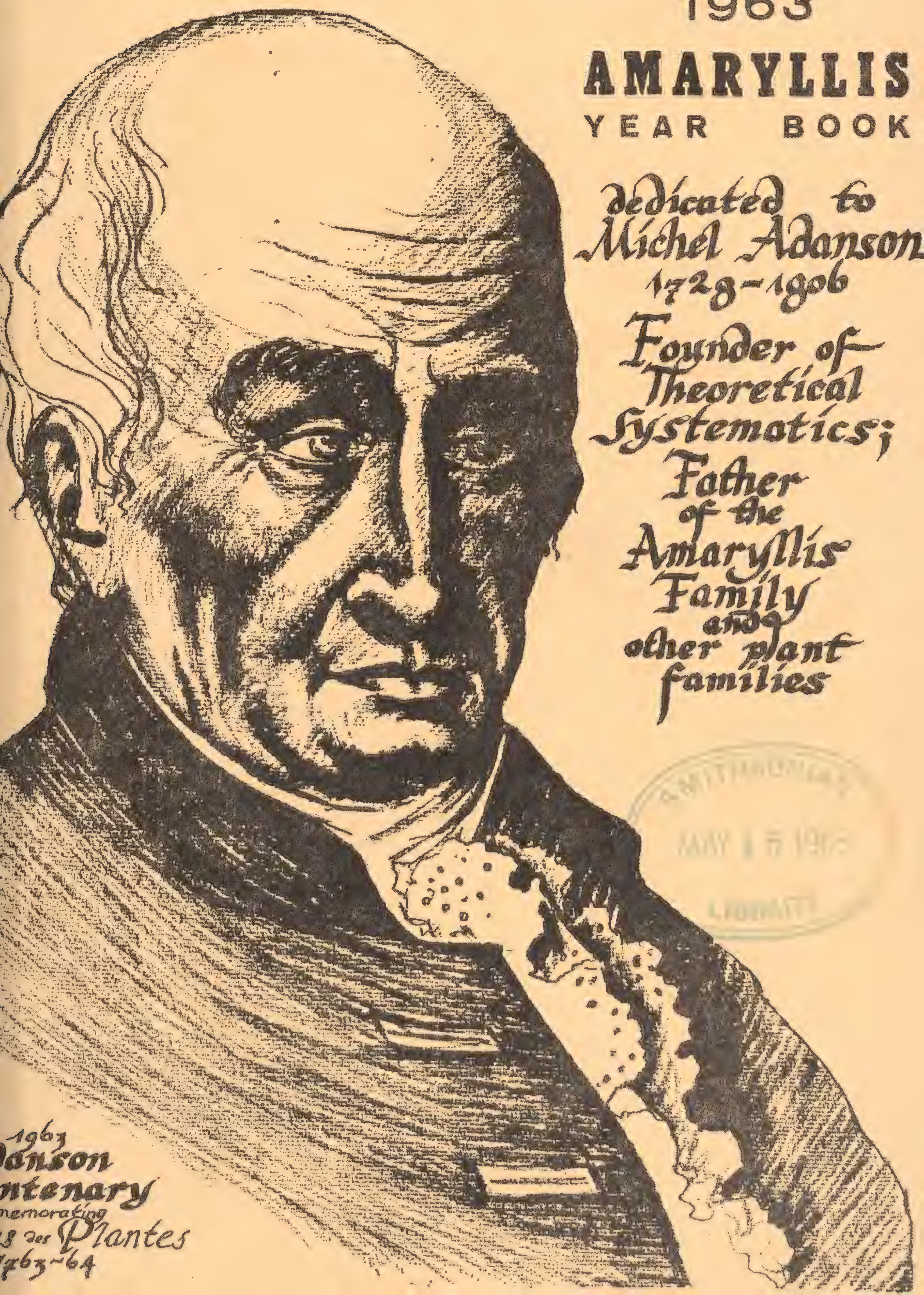
# PLANT LIFE

## 1963

## AMARYLLIS YEAR BOOK



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Theoretical
Systematics;
Father
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Amaryllis
Family
and
other plant
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PLANT LIFE, VOL. 19, NO. 1, January, 1963

# AMARYLLIS
# YEAR BOOK
# 1963

Year Book of
The American Amaryllis Society
30th issue

GENERAL AMARYLLID EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California

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[THE AMERICAN AMARYLLIS SOCIETY—continued on page 155.]

# PREFACE

The year 1963 marks the 200th anniversary of the publication of Michel Adanson's "Familles des Plantes". This event is of major significance in the development of the science of biosystematics. It is also of interest to the members of the Society because the work commemorated contains the *first description* of the amaryllids as a natural group. This subject is elaborated in an article in the present issue; in it there is also brief mention of the ADANSON BICENTENARY celebration in 1963-64.

The outstanding ADANSON BICENTENARY cover design is the work of the Artist to the Society, Prof. Penrith Goff, of the University of Chicago. He is to be congratulated on an excellent job.

It is fitting that the 1963 issue of the AMARYLLIS YEAR BOOK is dedicated to Michel Adanson, the Father of the Amaryllis Family, and also to Mr. W. D. Morton, Jr., who received the WILLIAM HERBERT MEDAL award for 1963 for his outstanding contributions toward the advancement of the amaryllids, and also to La Forest Smith Morton (1887—1955). Mr. Morton carried forward the important work started by his wife on the registration of Amaryllis clones, the elevation of the standards for judging Amaryllis, and the encouragement of the organization of local Amaryllis societies—all in collaboration with the officers of the Garden Circles Amaryllis Club, the Dallas Amaryllis Society, the Shasta Garden Club of San Antonio, Texas, the Houston Amaryllis Society, the Hattiesburg Amaryllis Society, the Mobile Amaryllis Society, the Amaryllis Forum of Mobile, the Men's Amaryllis Club of New Orleans, the Coastal Bend Amaryllis Society, and the Valdosta (Ga.) Men's Garden Club. Mr. Morton and the officers of these local Amaryllis societies are to be congratulated for their untiring devotion to this work. It was not possible to award the HERBERT MEDAL to all of these workers, but in awarding it to Mr. Morton, his wife, the late La Forest Smith Morton, and all of the workers are also honored.

Mr. Morton contributes an interesting autobiography, and Mrs. Haydel has favored us with a brief biography of Mrs. Morton.

The present issue contains biographies of Mr. Buller, the South African amaryllisarian, and Mr. Alick Percy-Lancaster, who worked with his father on the descriptions of *Gloriosa.* Mr. Sydney Percy-Lancaster writes a charming report on his journey from Rhodesia to India.

The articles on *Amaryllis* in the present issue are outstanding as usual. First of all, the important reports on the symptoms of *Amaryllis* mosaic disease by Drs. Kahn & Smith, and by Mr. Quinn Buck, are to be noted. All of us have been waiting for reports of this kind because these promise to help in eradicating this disfiguring disease. Equally important are the reports on the effects of the 1962 freeze in the lower South, and the lessons to be learned therefrom, by Mrs. Pickard, and Messrs. Perrin, Latapie, Authement and Davis. These reports are valuable as a base for future programs on overwintering amaryllids in the lower South.

Mr. Goedert's annual report on the Amaryllis season just passed is a feature that all members look forward to. Two new *Amaryllis* species are described—*A. starkii* Nelson & Traub, and *A. chionedyanthe* Cardenas; Mr. Fesmire writes on a longer *Amaryllis* flowering season; Mr. Boshoff-Mostert on the culture and breeding of *Amaryllis* in South Africa; Mrs. Seale on the flowering of the Boshoff-Mostert *Amaryllis;* Mrs. Tebban on the moving of her *Amaryllis* from Illinois to Florida; Mr. Beckwith D. Smith on the growing of *Amaryllis* in north Georgia; Mrs. Abendroth on the Blue Amaryllis in Brasil; Mr. Sudd on the use of artificial light in *Amaryllis* culture; Mr. Cloutte on seedling records and the clone 'Mrs. Garfield'; and Mrs. Williams on red leaf spot control. Mrs. Flick contributes excerpts from the Amaryllis Round Robin letters.

As usual, the other amaryllids are not neglected—new species of *Hymenocallis* and *Zephranthes* are described; Mrs. Shirley and Mr. Clark report on native American Crinums; Mr. Hannibal writes on *Crinum flaccidum;* Mr. Hunt on *Lycoris* in North Carolina; Miss Grapes on *Lycoris* in Nebraska; Mr. McNeil on *Cryptostephanus;* Dr. Flory & Mrs. Schmidhauser on the chromosomes of the Blue Amaryllis; Messrs. Caldwell, and Jacoway, on Lycoris breeding; Mrs. Anderson on breeding Brunsvigias and Crinodonnas; Dr. Joseph C. Smith on *Hymenocallis velardei;* Dr. Zorbach on amaryllids in Maryland, and Mrs. Schumann on amaryllids in Michigan. There are other interesting items, including the reports on the 1962 Amaryllis shows.

Contributors to the 1964 issue of THE AMARYLLIS YEAR BOOK are requested to send in their articles by August 1, 1963, in order to insure earlier publication of this edition. Unless articles are received on time, publication will again be delayed to June or July or even later as with some issues in the past. Your cooperation toward earlier publication will be greatly appreciated.

*December 15, 1962,*
*5804 Camino de la Costa,* *Hamilton P. Traub*
*La Jolla, California.* *Harold N. Moldenke*

## THE GENERA OF AMARYLLIDACEAE

"The Genera of Amaryllidaceae", by Hamilton P. Traub, 85 pages, 10 illustrations, $5.00 postpaid, is now ready. This represents a great amount of time and work. It includes a short history of the Amaryllis Family, a chromosome atlas of the amaryllids, and other introductory matter; a key to, and descriptions of, the 97 genera and 5 bi-generic hybrids, of the Amaryllidaceae; and an index to the genera. This handy reference booklet should be within reach of all who are interested in the Amaryllids. Send orders to: Dr. Thomas W. Whitaker, Executive-Secretary, American Plant Life Society, Box 150, La Jolla, Calif.

Commemorating the publication of
"Familles des Plantes", 1763-64;
this book is dedicated to
Michel Adanson (1728-1806), founder of
theoretical systematics; father of
the Amaryllis Family;
and to
William D. Morton, Jr., and La Forest Morton,
who re-established the registration of
*Amaryllis* L., cultivar names
after World War II

Herbert Medalist—William Douglas Morton, Jr.

# WILLIAM DOUGLAS MORTON, JR.

## AN AUTOBIOGRAPHY

I was born on September 16, 1887, at Louisville, Kentucky, the son of William Douglas, and Rosalie Tandy, Morton, Sr. My father had acquired an interest in a lumber mill at Montague, Florida, and when I was four, we moved to Florida. My mother died when I was nine, and we moved to Ocala, Marion County, Florida, where I was educated in the public schools. My boyhood was lived in the beautiful country side of central Florida where the fascinating Silver Spring is located near Ocala. My education was later supplemented with a special course in mathematics at Morrison's School, Savannah, Georgia.

When my father sold his interest in the lumber mill in 1905, we moved to the lumber town of Cutting, Georgia, where he was general manager of a large lumber mill for the Minnesota Lumber Company. At this time, I took up the vocation of locomotive engineer, and also had the pleasure of first meeting Miss La Forest Smith of Homerville, Georgia, and we became good friends. We began to correspond since I could not visit with her often.

In 1907, I was employed by the Bailey Mfg. Company, of Waycross, Georgia, for the installation of some huge steam equipment for their mill, and while there I was fortunate enough to meet Mr. H. Cardoza Sloan, electrical engineer for a large engineering firm in Jacksonville, Florida, who, on the basis of the work performed, employed me in June 1909 as assistant sales engineer in the large repair plant.

La Forest and I continued to write to each other and on June 8, 1909, we were married. During this period, I went on a tour of duty at Alton, Florida, to supervise the repair of some large electrical equipment damaged by fire. With the completion of this work, we returned to Jacksonville, Florida, where I served as assistant sales manager for the Florida Electric Company.

At Jacksonville, Florida, we bought a home on a large lot, and this gave us an opportunity to indulge our gardening inclinations. My wife specialized in roses, and the beautifully landscaped yard became a show-place. We were blessed with two children—a boy, William Douglas III, and a girl, Rosalie La Forest.

In connection with my vocation, I transferred to Tampa, Florida, as manager of the General Electric Supply Company warehouse in May 1919. We lived in rented quarters where gardening was pursued as best as possible until August 1929, when we moved to New Orleans. Here again, we lived in a rented home for two years while looking around for a suitable location for our permanent home. When this was found, we settled down for gardening as our joint avocation, and we became interested in *Amaryllis*, a hobby that grew and grew with the years. My wife was also active in garden club work, and other activities concerned with civic improvement.

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[The reader is referred to the biography of La Forest Smith Morton for the period from 1931 to 1955. See pages 11-12.—*Editor*].

After Mrs. Morton's death in 1955, the American Amaryllis Society headquarters requested me to assume direction of the registration of Amaryllis names as well as the other activities concerned with the organization of local societies, and the Official Show Standards program because I had worked intimately with Mrs. Morton on all of these matters, and they believed that I was best prepared for this important assignment initiated by Mrs. Morton and which was so dear to her.

It was necessary to continue and perfect the standards of judging Amaryllis so that these standards could again be raised to the highest level possible, and also to organize the various Official Amaryllis Judges Instructor sections which were to function under the National Amaryllis Judges Council. Mrs. B. E. Seale of the Dallas (Texas) Amaryllis Society became the Chairman of the Council, and I have functioned as the Registrar of Amaryllis Names, and Secretary of the Council. The forms for teaching Amaryllis judging were gradually improved through the cooperation of Mrs. B. E. Seale, Mrs. A. C. Pickard, Mrs. H. J. Haydel, Mr. Robert E. Parker, Jr., and others, with the approval of National Headquarters.

The first examination for the Amaryllis Judges Certificate since the last war was taken by Mrs. Morton. Having passed the examination, Certificate No. 1 was issued to her, and she was appointed the first Official Amaryllis Judging Instructor, and by 1955, sixteen additional candidates passed the examination and received certificates. Up to the present 117 Certificates have been issued, and it is planned to give refresher courses at convenient intervals of years so that judges may be kept informed about new developments. Up to the present, the number of Official Instructors has increased to seven.

The registration of hybrid Amaryllis clones proved to be a difficult problem. By 1955, Mrs. Isabelle Parker, of Biloxi, Miss., had registered the hybrid Amaryllis clone 'Faith', and the Dutch Amaryllis breeders expressed an interest in registering their clones, but before this could be followed up, the Captain was taken away. The response of the Amaryllis breeders has been notable. They realized that it is necessary to register names first of all to obtain priority to the names, and secondly to avoid duplication of names. The result of the registration of names has been that the quality of the product has been standardized. With the correct descriptions available for the clones, the buyer has a bill of specifications and thus the dealer is not apt to substitute an inferior product. I am happy to report that the cooperation of the breeders and dealers has now been obtained, including Ludwig & Co., Van Meeuwen & Sons, W. Warmenhoven & Zonen, W. S. Warmenhoven, C. Warmenhoven, Van Waveren & Sons, Harry de Leeuw Co., Mr. Boshoff-Mostert, and breeders and growers generally, including the members of the Society who breed Amaryllis. In 1956 Ludwig & Co. appropriately registered an outstanding hybrid Amaryllis clone, 'La Forest Morton'. By 1958, ten breeders had registered clones. In 1959, five and a half closely printed pages of registered hybrid Amaryllis clones appeared in the Amaryllis Year Book. By 1963, there are 34 active Amaryllis breeders who have registered clones since world war II.

By 1955, in addition to the Garden Circle of New Orleans, three additional local societies interested in Amaryllis had affiliated with the American Amaryllis Society—the New Orleans Amaryllis and Bulb Society, the Shasta Garden Club of San Antonio, Texas, and the Dallas Amaryllis Society. Since 1955, eight additional local societies interested in Amaryllis have affiliated with the National Society—The Amaryllis Society of Mobile, The Houston Amaryllis Society, The Hattiesburg (Miss.) Amaryllis Society, The Men's Amaryllis Club of New Orleans, The Coastal Bend Amaryllis Society, The Men's Garden Club of Valdosta, Ga., and The Greater Houston Amaryllis Club. A local Society is being organized in the Palestine, Texas, area.

There is still work to be done. A catalog of named clones has to be prepared, new named clones have to be registered, the standards for judging Amaryllis have to be kept high, additional local Amaryllis societies have to be organized, and breeders are to be encouraged to breed excellent new clones to edify the tastes of the Amaryllis enthusiasts. However, the work is past the pioneer stage from the slump due to the last war, and the energy can be devoted to conserve the gains and to make additional progress where possible.

Mention should also be made of the wonderful cooperation of Messrs. Robert D. Goedert, Mr. Claude E. Davis, Mrs. H. J. Haydel, and Mrs. A. C. Pickard in assisting with the description of the named Amaryllis clones. Particular credit should go to Mr. Edward F. Authement, who has recently assumed the post of Assistant Registrar, and who is doing an excellent job in helping to extend the goals already reached.

## LA FOREST SMITH MORTON, 1887-1955

### A BIOGRAPHICAL SKETCH

La Forest Smith, daughter of William Thomas, and Annie Shaw, Smith, was born May 12, 1887, at Valdosta, Georgia. She graduated from the local high school. Her father owned a large parcel of land near the City of Homerville, Georgia, where he built a home and where La Forest was able to indulge her early fondness for flowers. Her mother specialized in roses and she followed in her mother's footsteps for some time. Mr. Smith had some very fine pine timber on his property, and Mr. W. D. Morton, Sr., who was general manager of a large lumber mill at Cutting, Georgia, contracted to buy the lumber for the mill. It was through him that she first met his daughter, Ethel Morton, and in turn became acquainted with Ethel's brother, Mr. W. D. Morton, Jr., her future husband.

[See autobiography of W. D. Morton, Jr., page 7 in the present volume for account of her marriage and life with him until both specialized in Amaryllis at New Orleans beginning in 1931.—*Editor*].

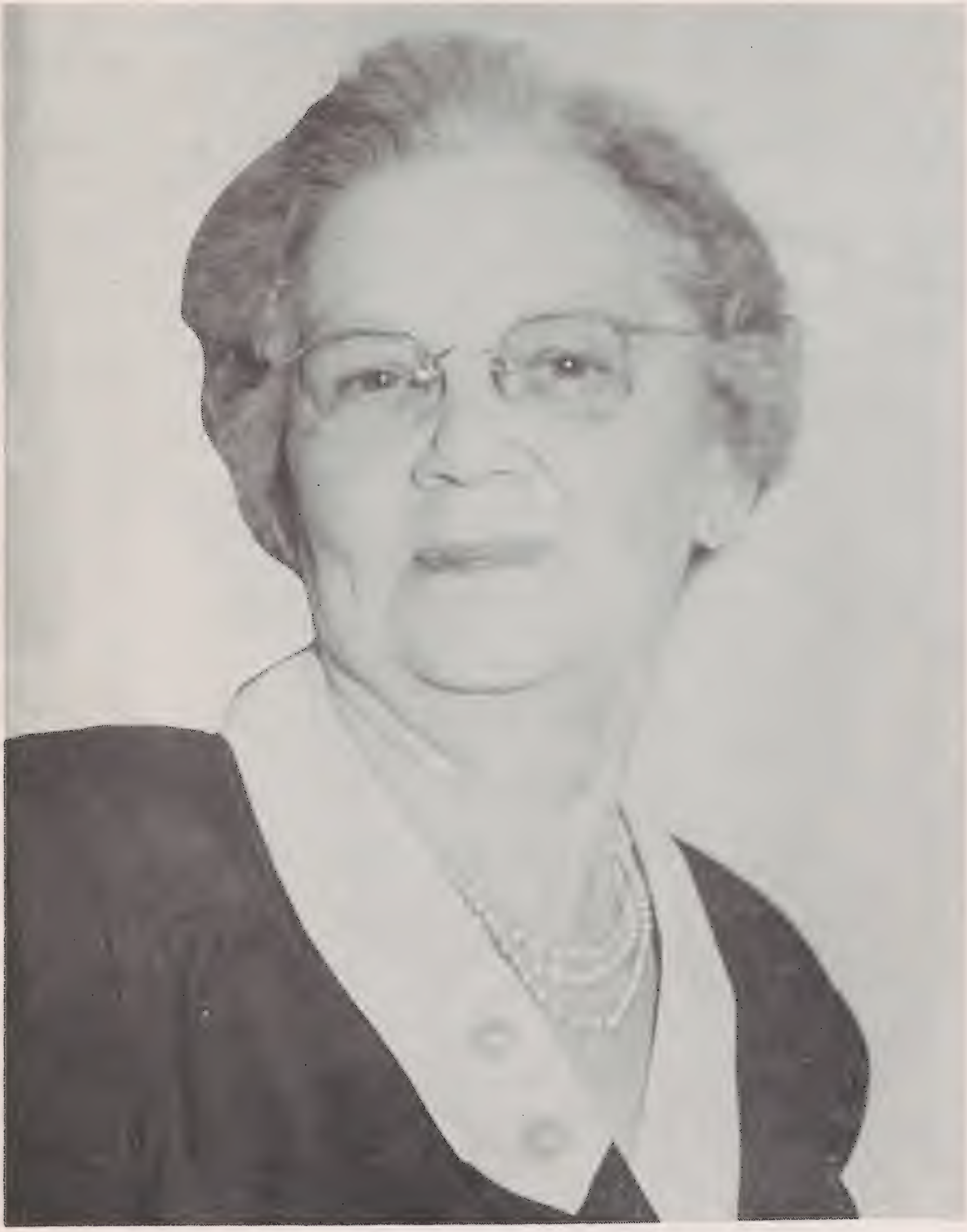

Fig. 2. La Forest Smith Morton in 1954. Photo courtesy The Times-Picayune Publ. Co., New Orleans.

At New Orleans, beginning in 1931, Mrs. Morton purchased many named clones of Hybrid Amaryllis, and she had wonderful success with them. The second world war intervened. After the war she found that the various Holland growers had duplications of names, and sometimes even included bulbs not true to name. All of this was quite confusing as no great dependence could be placed in buying named Amaryllis clones—they varied in color, size and so on. Mrs. Morton visited many Amaryllis growers in New Orleans and they too were confused about the unreliable named clones. She decided that something had to be done about it, but it was a question as to how to proceed. In the 1940's she wrote to Dr. Hamilton P. Traub, Editor, American Amaryllis Society which is affiliated with the American Plant Life Society, about the problem. He explained that before the war, Amaryllis clones were marketed in the United States by American breeders, who registerd thir clones, but this was stopped by the war. The market was confined to American clones dues to the quarantine which greatly restricted the importation of bulbs from abroad. He explained that by registration the duplications were weeded out. Unfortunately, those who were active in this work before the war had either passed to their rewards, or if living, did not go back into it after the war. He suggested that Mrs. Morton assume the position of Registrar of Amaryllis clones, a post that had been vacant since the death of Prof. Ballard. She accepted this responsibility and although progress was slow at first, she persevered and as time went on success was in sight.

As one aspect of this work, Mrs. Morton, with the cooperation of the Garden Circle of New Orleans, staged the first local Official Amaryllis Show after the second world war at New Orleans in 1949 (see Plant Life 5: 49. 1949). The shows increased in size and quality each year, but it soon became apparent that something had to be done to standardize the methods of judging Amaryllis. Here again, those who had started this work before the war, as far back as 1934, did not return to it after the war. It was necessary to start all over again. Mrs. Morton, and the Garden Circle members, took up the matter with Dr. Traub at National headquarters, who suggested that Official examinations for the Amaryllis Judges Certificate, which had lapsed since the beginning of the late war, should be reinstated. He assisted in making out the first examination questions, and classes were offered under the auspices of the Garden Circle to all interested Amaryllis enthusiasts. In this way the Official Amaryllis Judges Certificate was revived with the cooperation of the Garden Circle. Later, Mrs. B. E. Seale, of the Dallas Amaryllis Society, and other local Amaryllis Societies assisted in this important work. Soon all Official Amaryllis Shows were judged by accredited judges, and the public was well pleased. There were some slight objections from a few who wanted to lower the standards for the shows, but when the arguments in favor of having only the very highest goals for all Official shows was presented to them, all eventually favored upholding the highest possible standards.

Then, suddenly, the Captain was taken away—Mrs. Morton unexpectedly died on October 28, 1955. Mr. & Mrs. Morton had worked closely together on Amaryllis, and he had helped her whenever possible. It was natural that he should be called upon to continue the work now well started that he knew intimately and should carry it to a successful conclusion. On request from National Headquarters, he shouldered this responsibility in cooperation with the Garden Circle, the Men's Amaryllis Club of New Orleans, and other local Amaryllis societies.

[For the continuation of the account of this work see Mr. Morton's autobiography on pages 8-9 of the present volume.—*Editor*].

It should be noted for the record, that Mrs. Morton was the President for four years of the Garden Circle which is now entitled Garden Circles Amaryllis Club.

It required a sizable cabinet to house the many trophies received by Mrs. Morton (see Plant Life 11 : 15, fig. 1. 1956). She received cups for being the most outstanding member of the Garden Circle for the years 1953, 1954 and 1955. She received a cup when she was voted Life Honorary President of the Garden Circle. She received two gold keys to the City of New Orleans for her work toward founding the New Orleans municipal Amaryllis Garden, and for outstanding work toward beautifying the City of New Orleans, and for staging outstanding annual Official Amaryllis Shows since 1949. The many other awards in her cabinet of trophies were received for outstanding exhibits at the annual Official Amaryllis Shows. —*Mrs. A. J. Haydel.*

# MICHEL ADANSON (1728-1806), FATHER OF THE AMARYLLIS FAMILY

Hamilton P. Traub

The amaryllids as a distinct diagnosed, named and validly published systematic group can be traced back exactly two centuries—to 1763.

Previous to 1763, systematic groups below the rank of family—genera and species—had been named, described and validly published. Gaspard Bauhin (1560-1624) was among the first to recognize the distinction between species and genera. He is credited with first adequately describing species (Bauhin, 1623). He indicated the genera but did not describe them. Later, Tournefort (1656-1708), and John Ray (1627-1705) adequately described genera (Tournefort, 1700; Ray, 1686-1704).

Systematic groups above the generic level were indicated and named prior to 1763, but no attempt was made to describe or diagnose them. Pierre Magnol (1638-1715) pioneered in enunciating the concept of the "famille" stating that "plants have certain affinity which does not exist in any part considered separately but as a whole." He did not characterize any families. Linnaeus (1707-1778) toyed with the idea of grouping plants into natural groups above the generic level (Linnaeus, 1740, 1751). He grouped plants into orders that were equivalent to present day families, *but he never diagnosed or described* his orders.

Unfortunately, Linnaeus was satisfied with his static artifical sexual system (Linnaeus, 1753), for his day, in which the genera were grouped artificially on the basis of one or a few sexual characters. In this he took a backward step, and he was lost in this blind alley for the remainder of his life.

Thus matters stood in 1763, when Michel Adanson, the noted philosopher, scientist, encyclopedist, and father of theoretical systematics (see Traub, 1962), published the second volume of his ''Familles des Plantes'' (Adanson, 1763-64), ten years after Linnaeus had published his artificial system. In ''Familles des Plantes'' Adanson applied his multivariate principle—considering all of the characters on an equal basis—to the classification of the plants known to him, on the familial level. This revealed 58 natural families which he named and *adequately described* for the first time.*

Adanson ranks among the great biologists of all time. He was so far ahead of his time that his work was not fully understood until the lapse of two centuries when Sneath used the Adansonian multivariate principle in classifying bacteria, including the use of electronic computers (Sneath, 1957a; 1757b). At the time when Linnaeus (1753) championed the artificial method of classifying plants, Adanson had the genius to see that this was in fact a dead-end street, and he had the courage to say so, and to do something about it. This however cost him dearly. For a considerable time systematics fell into the hands of the nomenclaturists who set up petty rules for naming plants. They believed that the tool—the bionomial method of naming plants first consistently used by Linnaeus (1753)—was all important. If the work of an original thinker did not meet the petty requirements of their rules, his systematic groups were outlawed. Thus it happened that Adanson's original work was left unrecognized as a contribution of importance until two centuries later when the celebration of the bicentenary of the publication of Adanson's ''Familles des Plantes'' serves to reveal to the world the rightful place of Michel Adanson in the history of science (see Traub, 1962).

One of the families described by Adanson in 1763 is *Liliaceae* Adans.** under which he recognized and described several subgroups (sections) which are equivalent to present day subfamilies. One of these subfamilies is Section *Narcissi* (=subfamily *Narcissoideae* Adans.**). This represents the first description of the group we now recognize as the amaryllids.

A translation of the description of subfamily *Narcissoideae* Adans., from the French of Adanson (Familles des Plantes, 1763, pp 55-56) is given below. This includes also Table 1, a list of the 12 genera included, and with brief tabulation of descriptive data.

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* A year after Adanson described families for the first time, Linnaeus (1764) repeated himself in publishing a revised grouping of genera under natural orders, **again without descriptions.** He never graduated above this stage.

** The endings are in accordance with Art. 18, Int. Code (Lanjouw, et al., 1961).

## DIAGNOSIS (**Description**) of Subfamily **Narcissoideae** Adans. (Narcissi)[1] family **Liliaceae** Adans.

Only *Hemerocallis, Agave* and *Pothos* [= *Polianthes* L.] have fibrous or tuberous roots; the others produce a bulb, formed of entire tunics which envelop each other.

Mostly the leaves, although alternate in emerging from the bulb, diverge on two opposite sides so that they face each other. They have their origin in the sheath which is split only in *Hemerocallis, Agave* and the tuberose [*Polianthes* L.] which is the *Pothos* of Theophrastus. When broken, one can see within (the leaves), except in *Agave, Pothos* [= *Polianthes* L.], *Atamasco* [= *Zephyranthes Herb.*], *Nivaria* [= *Leucojum* L.] and *Hypoxis,* especially when dry, that they are composed of a great number of threads which resemble extremely fine silk, and are as white as snow. These [threads] can be distinguished at a glance. One can observe these [threads] also, but a great deal less, in some species of *Ornithogalum.* The threads are like spiral spring tracheae.

Their flowers are arranged in the form of a spike, a panicle or an umbel. Those which have a spike or a panicle, are each subtended by one bract; those which have an umbel are enclosed in a spathe composed of one to six valves or parts. Besides this one can see within the umbel as many bracteoles as there are flowers. In the case of the spike of *Pothos* [= *Polianthes* L.], the flowers are arranged in pairs, subtended by a common bract, which are again each accompanied by a very small bracteole.

Their perianth is united [below]; it is regular or irregular, and is situated on top of the ovary which it envelops, making up part of this organ. It makes up to one-half, or in *Hemerocallis* and *Pothos* [= *Polianthes* L.], up to two-thirds, of the ovary. It [the perigone] appears to be composed of six distinct segments [not united below] in *Acrocorion* [= *Leucojum* L.] and *Hypoxis.* Sometimes it is double inside of this process (the perigone), where a second tube develops which is known as the nectary [= paraperigone], which has the appearance of a perigone, and which accompanies the fruit to maturity [Adanson here refers to the "cup" in *Narcissus*].

They have six stamens attached at the apex of the perigone-tube [= tepaltube] or the nectary [the staminal cup in *Pancratium*], but always in such a manner that they are opposite each of its divisions.

All have only one cylindrical or conical stigma, not distinct from the style, except *Pothos* [= *Polianthes* L.] which has three medium ones.

*Gethyllis,* which I am naming *Abapus,* because the name *Gethyllis* has been applied to the leek by Theophrastus, undoubtedly belongs to the section [subfamily] Narcissi [= *Narcissoideae*][1] as shown by its spathe, the location of its stamens and by the position of the perigone on the ovary. Of the twelve stamens attributed to it, six apparently are on the nectary as six theeth or threads, placed below the others, in a second rank as in *Pancratium.* This then conforms to all of the botanical knowledge available on the subject of this African plant until we have a more exact description.

Thus the amaryllids as a natural group were definitely characterized by Adanson in 1763. However, A. L. de Jussieu (1748-1836) who was not intellectually honest, and for the rest of his life did all in his power to downgrade the achievements of Adanson, appropriated the plant families of Adanson and included them in his "Genera Plantarum" (Jussieu, 1789) without giving due credit to the source (see Chevalier (1934), Glass (1959), Traub, (1962). Jussieu increased the

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[1] Ending according to Art. 18, Int. Code (Lanjouw, et al., 1961).

TABLE 1. List of genera with brief diagnoses included in subfamily **Narcissoideae** Adans.[1] (Sect. Narcissi) of family **Liliaceae** Adans., according to Adanson (1763). Translated from page 57, "Familles des Plantes," 1763.

Adanson in most cases cited earlier authorities than the one listed in the footnotes—1763—for his generic names. The starting point of nomenclature was arbitrarily set at 1753 in the International Code in the 19th century.

| | **Roots** | **Leaves** | **Inflorescence** | **Spathe** | **Perigone** |
|---|---|---|---|---|---|
| **Hemerocallis L.** | fibrous | opposite | panicle | 1 bract under each flower | tube short [2] |
| **Agave L.** | ditto | radial | ditto | ditto | ditto |
| **Pothos Adans.**[3] | tuberous fleshy | ditto | spike | ditto | tube medium |
| **Hypoxis L.** | bulb | ditto | ditto | ditto | tube absent |
| **Acrocorion Adans.**[4] | ditto | opposite | one or several per umbel | 1-valved | ditto |
| **Tanghekolli Adans.**[5] | ditto | radial | ditto | 2-valved | tube long |
| **Haemanthus L.** | ditto | opposite | ditto | 6-valved | ditto |
| **Atamosco Adans.**[6] | ditto | ditto | ditto | 2- to 3-valved [6a] | tube short |
| **Amaryllis L.** | ditto | ditto | ditto | 2-valved | ditto, scales alternate with segments |
| **Narcissus L.** | ditto | ditto | ditto | 1-valved | tube long; cup entire [7] |
| **Pancratium L.** | ditto | ditto | ditto | 1-valved [8] | ditto; staminal cup of 12 parts [9] |
| **Abapus Adans.**[10] | —— | —— | —— | 1-valved | ditto; nectary of 6 parts [11] |

[1] Ending of subfamily name according to Int. Code (Lanjouw, et al., 1961).

[2] 'tube' refers to 'tepaltube' formed by the union of the tepals for part of their length below.

[3] **Pothos** Adans., 1763, **non** L. 1753 = **Polianthes** L.

[4] **Acrocorion** Adans. 1763 = **Leucojum** L. 1753. In the text Adanson uses "Nivaria Heist." (1748), which is superceded by **Nivaria** Medic. 1790. Both are synonyms of **Leucojum** L.

[5] **Tanghekolli** Adans. 1763 = **Crinum** L. 1753.

[6] **Atamasco** Adans. 1763 = **Zephyranthes** Herb. 1821, nom. conserv.

[6a] Apparently "2-valved" refers to the 2 free tips above the tubular base; and "3-valved" refers to other species included which are now excluded from the genus **Zephyranthes.**

[7] 'cup entire' refers to the paraperigone or cup in **Narcissus.**

[8] Evidently a typographical error. Spathe is 2-valved. If he intended "1-valved" then 'ditto' would have been used consistent with rest of table.

[9] The figure '12' apparently is a typographical error since this fits under **Abapus** below as shown by the discussion under Adanson's diagnosis. See also under (11) below.

[10] **Abapus** Adans. 1763 = **Gethyllis** L. 1753.

[11] The figure '6' apparently is a typographical error since this fits under **Pancratium** above as shown by the discussion under Adanson's diagnosis. See also under (9) above.

number of plant families to 100. In the case of the amaryllids, he raised Adanson's subfamily *Narcissoideae* to familial rank, again without giving due credit. A summary of the family *Narcissaceae* (Adans.) Jussieu is given in Table 2, below:

It should be noted that six genera—*Bulbocodium, Tulbaghia, Galanthus, Pontederia, Alstroemeria,* and *Tacca*—were added, and two genera—*Agave* and *Atamasco*—admitted by Adanson, were omitted. This leaves a net total of 16 genera.

In the latter half of the 18th and early 19th centuries, the rule of priority was recognized and was usually followed as a gentleman's responsibility, but there were sometimes serious breaches in its observance. Thus, Jaume St.-Hilaire adopted the family *Narcissaceae*

Table 2. Family **Narcissaceae** according to A. L. de Jussieu, 1789

| | | |
|---|---|---|
| | I. Ovary superior | |
| **Gethyllis** L.[1] | **Hemerocallis** L. | **Tulbaghia** L. |
| **Bulbocodium** L.[2] | **Crinum** L.[3] | |
| | II. Ovary inferior | |
| **Haemanthus** L. | **Pancratium** L. | **Leucojum** L. |
| **Amaryllis** L. | **Narcissus** L. | **Galanthus** L. |
| | III. Genera Narcissis non omnino affins[4] | |
| **Hypoxis** L. | **Polianthes** L. | |
| **Pontederia** L. | **Alstroemeria** L. | **Tacca** Rumph. |

[1] Incorrectly placed, ovary is inferior.
[2] Now included in the **Liliaceae.**
[3] Incorrectly placed, ovary is inferior.
[4] These genera are now excluded from the amaryllids.

(Adans.) Jussieu in his "Familles Naturelles" in 1805, but quixotically changed the name to family *Amaryllidaceae* Jaume St.-Hilaire (ordo Amarylleae), as shown in Table 3, below:

Table 3. Family **Amaryllidaceae** according to Jaume St.-Hilaire, 1805.

| | | |
|---|---|---|
| | I. Ovary Superior | |
| **Gethyllis** L.[1] | **Hemerocallis** L. | **Tulbaghia** L. |
| **Milla** Cav. | **Crinum** L.[2] | |
| **Bulbocodium** L.[3] | **Agapanthus** L'Herit. | |
| | II. Ovary inferior | |
| **Haemanthus** L. | **Narcissus** L. | **Galanthus** L. |
| **Amaryllis** L. | **Eustephia** Cav. | |
| **Pancratium** L. | **Leucojum** L. | |
| | III. Genera qui ont de l'affinité avec les Amaryllièes[4] | |
| **Hypoxis** L. | **Pontederia** L. | **Tacca** Rumph. |
| **Leptanthus** Mich. | **Polianthes** L. | |
| **Heteranthera R. & Pav.** | **Alstroemeria** L. | |

[1] Incorrectly placed, ovary inferior.
[2] Incorrectly placed, ovary inferior.
[3] Now included in the **Liliaceae.**
[4] These genera are now excluded from the amaryllids.

It should be noted that five genera—*Milla, Agapanthus, Eustephia, Leptanthus* and *Heteranthera*—are added to those recognized by Jussieu (1789), giving a total of 21 genera.

The lead of Jaume St.-Hilaire was followed by most later workers with the amaryllids. This led to the legalistic adoption of the present name—*Amaryllidaceae.* The nomenclatural Code is peculiar. If a sin is committed—the publication of a superfluous name—and this sin is condoned by others and emulated over a period, then the sin becomes a virtue and the illegitimate name is recognized as the acceptable one. This is the reason that the family name *Narcissaceae* (Adans.) Jussieu, a name that goes back to Adanson's subfamily has been replaced with *Amaryllidaceae* Jaume St.-Hilaire. Although the name of the family has been quixotically changed, it is still the same group first described by Adanson in 1763, and does not detract from the genius of the man who first recognized and described it. Thus Adanson is in fact the Father of the Amaryllis Family.

For the later history of the Amaryllis family from 1805 to the present time, the reader is referred to Traub (1963)—"The Genera of Amaryllidaceae."

As indicated above, Adanson was the first to describe plant families (see Traub, 1962), and the Amaryllis family is only one out of a total of 58 which he first described. It is planned to cover these additional families in a separate article later.

We are indebted to Prof. Goff of the University of Chicago for the fine Adanson Memorial Cover of this 1963 Amaryllis Year Book. The reader should also note the World-wide celebration of the Adanson Bicentenary in 1963-64 to commemorate the publication of ''Familles des Plantes'' in 1763-64. The main symposium is to be held at the Hunt Library, Carnegie Institute at Pittsburgh, Penna., Aug. 18-19, 1963. Those planning to attend should write directly to Dr. Lawrence at the Hunt Library.

Memorial volumes will be published giving evidence to establish the honored place that Michel Adanson holds in the history of science.

### LITERATURE CITED

**Adanson, Michel.** Familles des Plantes. 1763-64. **Bauhin, Gaspard.** Pinax theatri botanici. 1623. **Chevalier, A.** Michel Adanson. 1934. Glass, Bentley. (Adanson as a forerunner of Darwin), in Chapt. 6, section II, "Heredity and Variation in the 18th Century Concept of the Species," pp. 151-157, in Glass et al, "Forerunners of Darwin, 1745-1859." Johns Hopkins Press, Baltimore, Md. 1959. **Jussieu, A. L. de.** Genera Plantarum. 1789. **Linnaeus, C.** Clavis classium, in Adrien van Royen, Florae Lydenensis Prodromus. 1740. **Linnaeus, C.** Philosophica botanica. 1751. **Linnaeus, C.** Species Plantarum. 1753. **Linnaeus C.** Ordines naturales, suppl. to Linnaeus, Genera Plantarum, 6th ed. 1764. **Ray, John.** Historia Plantarum. 1686-1704. **Sneath, P. H. A.** J. gen. microbiol. 17: 184. 1957a; 17: 201. 1957b. **Tournefort, J. P. de.** Institutones Rei Herbariae. 1700. **Traub, Hamilton P.** The Phyla of Organisms. suppl. Plant Life vol. 18. 1963. **Traub, Hamilton P.** The Genera of Amaryllidaceae. 1963.

## JOURNEY FROM RHODESIA TO INDIA, 1961

SYDNEY PERCY-LANCASTER,

*National Botanic Gardens, Lucknow, India*

I left Salisbury on the 16th October, missing the glorious avenues of *Jacaranda* that were just coming into bloom. Bauhinia had just finished its first flush and *Spathodia* and *Delonix* were in bud. *Schizoloboum excelsum,* with huge spikes of yellow flowers surmounting a tall scarred trunk, had also reached a flowering stage. The journey down to Beira, in Mozambique, where I was to catch the steamer to India, was dull as it was the end of winter. I noticed a *Sabal* like palm growing in swampy land, mature specimens were hardly more than 12 feet high.

We left Beira in cyclonic weather which delayed the steamer and we did not reach the first Port of Call, Dar-es-salaam, till 5-30 p. m., too late to contact the Government official whose office closed at 4 p. m. We left at night and reached Zanzibar next day, I went ashore to meet the District Agricultural Officer from whom I collected a *Gloriosa* called ''*G. superba*'' but from the dried specimen I was given with the tubers I guess it is a form of *G. carsoni.* I noticed a fine collection of uncommon palms in fruit, specimens of *Cyrtostachys lacca, Martinezia erosa, Latania commersoni,* and many others. Stepping into a restaurant for a cup of coffee I saw two lovely specimens of *Amaryllis Mrs. Garfield* in full bloom. Two new *Sanseviera* were seen but nothing in the plant line out of the ordinary.

Our next Port was Mombasa and I had lunch at the Mombasa Club with a Gardening friend who took me to the Public gardens and drove me around. I saw a copper coloured foliage shrub that was locally called ''Poinsettia,'' it was Euphorbiaceae right enough but not Poinsettia. The next day I accompanied my friend to the Government Nursery some 12 miles out of town and did enjoy myself. There were a large number of plants new to me, some that might have grown well in Salisbury but would never grow in Lucknow. Prices I noticed were exceptionally high, Bougainvillea Mary Palmer, which by the way is a variety that I had the pleasure of naming and distributing from Calcutta years ago, was selling at 30 shillings, in Lucknow these plants are sold at the equivalent of 3 shillings. The Bougainvillea grown here were very fine but in Salisbury too there are dozens of seedlings raised by keen gardeners who name them without any registration. There were some lovely forms of Pilea, Pellionia, Episcea, Billbergia and several Araceae. Unfortunately most of the plants that I wished to obtain were not in seed and it was impossible to get a phytosanitary certificate at such short notice.

The next Port was the Seychelles and not a hundred yards from the quay I came across an *Inga,* very close to *I. dulcis* but with red arils, seeds collected however failed to give a single plant. I saw again the *Lodoicea* and was fortunate to obtain two nuts from one fruit for the National Botanic Gardens, where they have been planted in the Conservatory. I met a *Gloriosa* like *G. superba* but differing slightly in colour, also a *Maranta* (*Calathea*) similar to one we call *M. regalis* in India, but, whereas the Indian species grows no more than 3 feet high, this variety was not less than 12 feet high and 5-6 feet in diameter! Unfortunately no one knows the names of plants. An enclosed area held a dozen large tortoises, or turtles, on which children were riding. Breadfruit, Mangosteen and Nut-meg were other uncommon plants I saw.

On the 1st November I landed in Bombay and spent a couple of very busy days seeing gardens, there are some very well laid out gardens which I was fortunate to visit. Back in Lucknow I drove to the N.B.G. after an absence of three years and found many changes. What hurt me most was the empty shrubberies, the depleted Conservatory and absence of correct names. During the floods large numbers of plants died, plants in pots were moved to higher levels but those in the ground had to stay under water for 5 days. Where transplanting had taken place names were hopelessly mixed and only after *Amaryllis* and *Cooperathes* (*Zephyranthes*) have finished flowering can I tell what is missing, and which under a wrong name. Parts of this garden were under 13 feet of water—a rushing stream that carried away an avenue of trees. The highest parts of the garden had four feet of water. The collection of years from distant parts of India, some from the Far East, had been damaged with little hope of replacement. *Cannas* and *Cooperanthes* I can soon replace with hybrid seedlings but other plants will be more difficult.

I arrived in India Bombay, on the 1st November 1961 and spent the next two days making a round of the City and suburbs, visiting gardens and parks. There was a definite improvement in the lay out of most gardens and a nursery man friend acknowledged that he was doing good business. The climate of Bombay is humid but never too hot nor too cold, it has a good rainfall and plants do remarkably well.

I journeyed on to Lucknow, 1420 kilometres away, and arrived at the commencement of winter. The climate of this part of India is dry; in the summer our temperatures go to 112 degrees as a rule, sometimes a bit higher. Winter temperatures are in the region of 40 degrees but this year we had a cold snap and registered 30 degrees, needless to say plants suffered heavily and even dwarf trees died, *Cordia sebestena* for instance. After a wash I left my quarters for a walk round the National Botanic Gardens and what disaster I discovered among the shrubberies, Cannas, etc., I had planted three years ago. A flood in October 1960 flowed over the garden carrying away an avenue of trees and placing the grounds under water for five days, in depth from 13 feet to four feet at the highest point. Lucknow has been called the City of Gardens, (Baghs), and a hundred and fifty years ago it certainly earned the name. The Nawabs of Oudh were keen gardeners, they liked fruit and scented flowers above others but from the Prime Minister down to the rich Zamindars (Landlords) all had their private Baghs. The Queens too had their little private gardens and I have listed some 40 names of areas in Lucknow called Bagh, such as Kaiser Bagh, Wazir Bagh, Secundra Bagh, etc.: that once upon a time were the glory of the city but are now built up areas.

Kanpur only 50 miles away is a large industrial centre and the gardens there are really well laid out. I have merely passed through the city this year, on a plant collecting trip, and could not attend their Shows owing to other engagements.

In February I was called to judge gardens in Calcutta (979 kilometres from Lucknow) and spent three days seeing as much as I could of the old Capital. My father had worked for 12 years with the Agricultural & Horticultural Society of India before his death and I followed from apprentice to Secretary serving the same Society for 51 years. Garden Competitions were held annually and never were there less than 20 gardens that entered. In 1962 there were just 12. Calcutta has a very moist humid climate and plants, with few exceptions, grow very well, though roses are never first class. Vegetation is lush and foliage growth all that could be desired. Having friends among the nurserymen of the city I discovered that business had never been so good, the demand for Cacti was something new and sales were rocketing.

I was back in Lucknow for three days when I had to travel to the Capital, Delhi, 486 kilometres away. Here I helped in judging exhibits in the "cut flower" and "plants in pots" Sections. It was not as well patronised by exhibitors as shows in past years, I was sorry to see, but the feature that attracted visitors was the "International Section." Here exhibits from France, Italy, Siam, New Zealand, Malaya, Thailand and Great Britain were beautifully displayed. Two Air Lines, the

B.O.A.C. and Pan-American, also put up exhibits and I did enjoy this feast of flowers. But the Show was open on Saturday afternoon for four short hours and the exhibits thereafter auctioned for the Y.W.C.A. Large numbers of people were disappointed as they failed to see the foreign exhibits. After the Show I spent a day with a friend who took me over the city, the Government Nursery, and to a new park which is being developed on The Ridge, a backbone of rocky land on which even thorns and thistles found it hard to grow. Water is being provided in ample quantity so that there can be a large canal, grass lawns and flower beds while suitable trees are being planted to give shade and colour. It was already well patronised by picnicers from the city.

I motored to Ghaziabad, a city some twenty miles away, and fast becoming an annexe to the Capital where industries are building huge factories. The garden I visited had been neglected and I suggested a lay out that would not interfere too much with existing trees, etc.

I was back in Lucknow and spent a couple of days at my desk when I had to organise the first Rose Show under the auspices of a Garden Lovers Society of which I am the Secretary. This was a new venture and very successful, the exhibits being numerous, and fairly good, while the visitors thronged the Hall where the flowers had been arranged.

My next engagement was judging gardens in Lucknow and I got the shock of my life when papers were handed to me showing that there were 33 competitors. The three judges were at it till late in the evening; actually there should have been two sets of judges to do justice to the work for these gardens were scattered all over the city. Two days later I had my final job when I helped judging at the Lucknow Flower Show. Quality was down and in vegetables the entries were very poor. Lucknow vegetable exhibits have, in the past, been outstanding and the one tent allocated to them this year—which was not half filled—would have needed duplication a few years back. The gardens in Lucknow are large and in ''the good old days'' when labour was cheap, every garden had an orchard and a vegetable garden that provided the table with most of the requirements of the kitchen.

Judging from the sale of plants and attendance at Flower Shows there seems to be a revival of gardening in India. The Government and the Municipal Corporations of large Cities are taking more interest in beautifying Public Parks and all who can afford it see that their gardens are a blaze of colour, at least during the winter months. In the dry Upper Provinces of India the summer heat, plus a hot west wind, plays havoc with plants.

## ALICK PERCY-LANCASTER, 1912-1961

### A Biographical Sketch

Alick Percy-Lancaster was born in Calcutta, India, on July 21, 1912, being the younger of twin sons. As a boy he showed great love for plants. He was educated at North Point, Darjeeling and at St. Edmunds, Shillong.

In 1930 he was appointed to the Royal Agri-Horticultural Society of India and spent a year in training under his father before taking a three years' course at the Royal Botanic Gardens, Edinburgh from 1931 to 1934, thereafter he went to the Royal Botanic Gardens, Kew for further training. On his return to India he was appointed Gardener in charge of the Governor's Estates in Bengal, Barrackpur, Calcutta, Dacca and Darjeeling. He worked here until he was appointed Assistant Superintendent, Horticultural Division, Central Public Works Department, New Delhi. In the Capital he was in charge of the Parks, Public Gardens, and Gardens attached to Protected Monuments, and so on, and was also responsible for all roadside and horticultural work in the City. He rose to be Superintendent on the retirement of the incumbent and later became the first Director of Horticulture. During this period his services were often borrowed by other States and he traveled all over India in the course of his duty. After twenty years of horticultural service in India, he resigned and went overseas to South Africa, but ultimately settled down in Salisbury, Southern Rhodesia, where he was joined by his father and mother. Early in 1961 it was discovered that he was suffering from high blood pressure and his heart was in consequence affected. Treatment at home did not bring about an improvement so he was hospitalized. In spite of every hope held out for his recovery, he suddenly passed away on September 22, 1961. He left a widow and three sons to mourn his loss—*Sydney Percy-Lancaster.*

Editor's note.—A brief note on the passing of Alick Percy-Lancaster appeared in Plant Life 18: 13. 1962, in which it was indicated that he was engaged on the Gloriosa Breeding Project with his father, Sidney Percy-Lancaster, when he died. The date of death there should be corrected from Sept. 28 to Sept. 22.—*Hamilton P. Traub.*

## ARTHUR CHEVERTON BULLER, 1874-1959

### A Biographical Sketch *

Mrs. C. Victor Schweizer,

*"Keerweer," Meadow Road, Rosebank,*
*Cape Town, South Africa*

Arthur Cheverton Buller was born on July 3, 1874, at Croydon, England; and died on May 7, 1959, at his estate in South Africa. He came to South Africa in 1893; his family had destined him for the Church but he felt a greater call for farming, and as did so many of the young men of the period like Cecil John Rhodes, he too sought his future in a new country. At first Mr. Buller worked as a learner-farmer on Karroo farms where ostrich, sheep and cattle were raised. The conditions were most primitive; climatic conditions were extreme—drought, fierce heat, and bitter cold rang the changes with none of the ameliorations which modern conditions have brought; even traveling in cattle trucks was a relief from the tedium of animal-drawn transport. After five years, Mr. Buller moved to one of the most beautiful and fertile parts of the world at Banhoek near the then small town of Stellenbosch, where he bought a farm, ''Dwarsriviershoek,'' for the purpose of growing fruit and vines in the wonderful scenic setting of mountains and valleys a few miles from the Cape Coast, with its superb Mediterranean climate. Here he was associated with the famous fruit grower who was sponsored by Rhodes, H. E. V. Pickstone, and the great statesman of the period, John X. Merriman, in pioneering the deciduous fruit industry. Later he experimented in cooperation with K. B. Quinan of nearby Somerset West in growing export grapes. Buller was one of the first to use the overhead trellising of vines, and specialized in methods of packing fruit in a period when cold-storage was unknown; successfully packing grapes for the long overseas journey in sawdust at one stage.

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* Written by Mrs. C. Victor Schweizer in 1961 at the request of Mr. Leon Boshoff-Mostert.

The information as to the dates of birth and death, and place of birth, of Mr. Buller, was furnished by The Hon. Mrs. J. M. de Villiers, daughter of Mr. Buller, in 1962.

The manuscript was received too late for inclusion in the 1962 issue and had to be held over for the 1963 volume.

Buller was a passionate lover of wild life and his farm was a sanctuary for the fast disappearing fauna and flora of the district. He took a great delight in photography and in time became an expert color-photographer. Though so constantly behind the camera, he was a most retiring model himself with the result that there are virtually no photographs of him apart from the compulsory Identity Card—a pallidly inadequate one taken in 1955.

Horticulture was his greatest delight, and he was renowned for his exhibition sweet-peas, roses and daffodils, until he became absorbed in *Amaryllis* (syn.-Hippeastrum).

Buller developed a system for propagating *Amaryllis* vegetatively by cutting up the bulbs; he also designed his own ''incubator'' for their propagation, until he had built up the first collection in South Africa, one of the best in the world. He corresponded and collaborated with breeders in the U. S. A., and in the United Kingdom, including Lionel de Rothschild who held him in high esteem. Eventually a selection from his collection was accepted for the royal gardens at Windsor Castle. With *Amaryllis* his interests were centered in blooms of one pure color or shading; he bred right away from the striped effects, and the funnel-shape, getting enormous wide-faced blooms in pure white, glorious crimson, and orange; one of his triumphs was the brilliant flame-colored, 'African Glow.'

Latterly he took a great interest in the proteas for which his farm was so naturally suited, and concentrated on the fabulous *Protea cynaroides,* leaving at his death a unique plantation of this magnificent indigenous plant; fortunately these plants in their setting are being cherished by his daughter as a fitting memorial to this far-sighted protector of indigenous plants.

Among other friends of his earlier life was the well-known gardening correspondent of the London Illustrated News, Clarence Elliott; their life-long friendship and mutual interest resulted among other things in the exporting to England of the large-lipped exquisite hardy herbaceous *Salvia azurea* christened "*African Skies*" by Buller, a luminous clear sky-blue many shades lighter than the sapphire blue of the *Salvia azurea* (type).

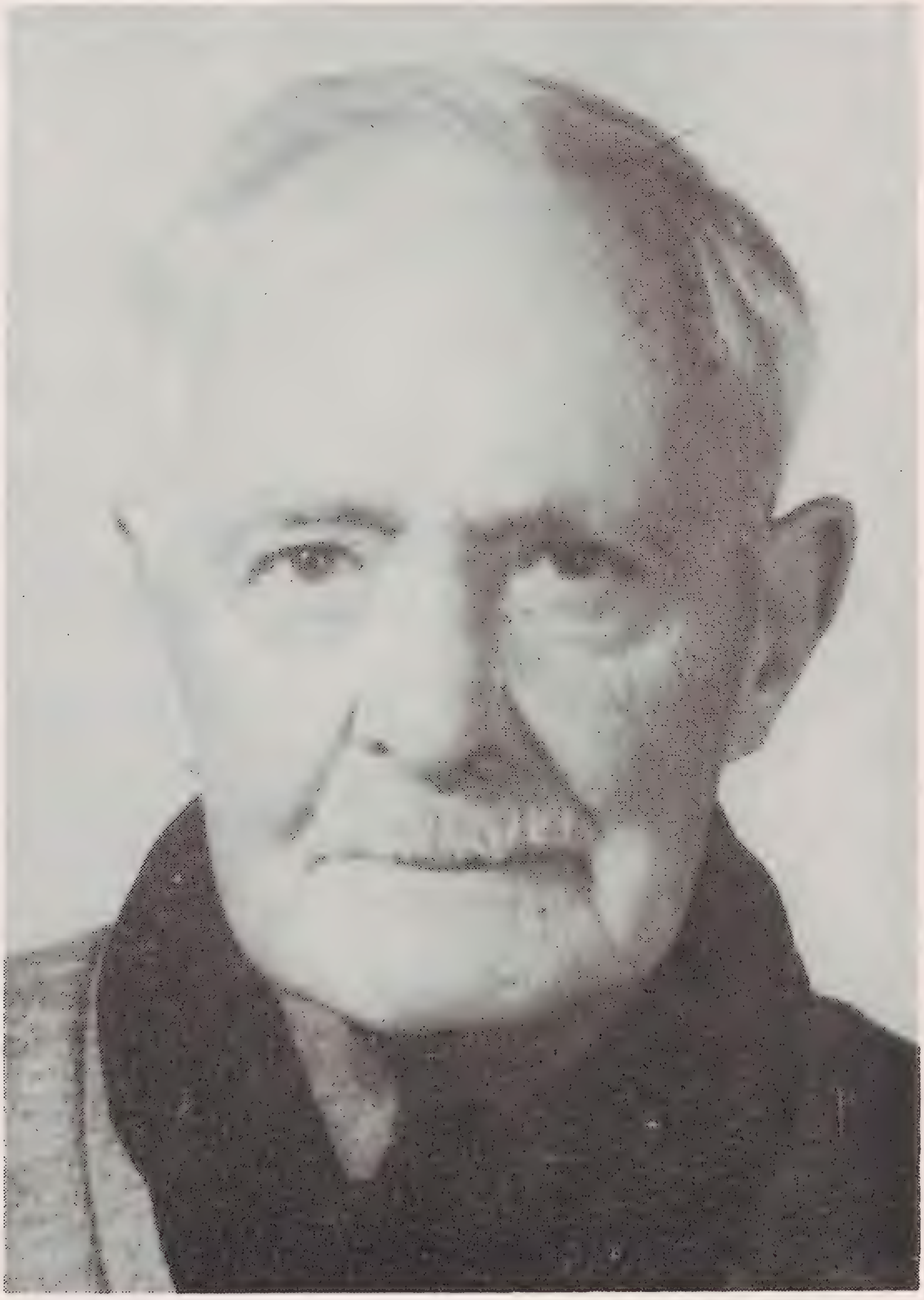

Fig. 3. Arthur C. Buller in 1955. Photo furnished by the Hon. Mrs. J. M. de Villiers, daughter of Mr. Buller.

Some 10 years before his death, Mr. Buller became interested in importing American Iris and making a collection of *Iris kaempferi*. At this time he ordered some Iris from "Kleinskuur" Iris Farm in the Transvaal. When forwarding the order, Mrs. Boshoff-Mostert returned Mr. Buller's check and asked Mr. Buller if he would let her have some Amaryllis for her husband in return. This he did and during the next three years gave Mr. Boshoff-Mostert a wonderful selection of hybrid Amaryllis from his collection as it then was. Mr. Buller visited the

Boshoff-Mosterts at "Kleinskuur," and Mr. Boshoff-Mostert visited with Mr. Buller at his estate, "Dwariviershoek", and was initiated into Buller's techniques and methods. From 1952 onwards, Mr. Buller continued to breed and build up what he called his "exhibition stuff" with which he did not part during his lifetime. After his death, the final collection—the culmination of all his years of breeding—was acquired by Howie's the well-known Cape horticulturists.

A charming introduction to South Africa was made when Clarence Elliot sent Buller seeds of *Leucocoryne ixioides odorata,* the Chilean "Glory of the Sun". Buller was very public spirited and opened his garden to the public for a small entrance fee, resulting in handsome sums for charity as people flocked to view the beauties of "African Skies", "African Glow", "Glory of the Sun", and the proteas. This tall fearless man was a stalwart in the district where he was a respected authority when he served on the Deciduous Fruit Exchange and Stellenbosch District Council; his influence and example will continue as an inspiration to all nature lovers.

## NURSERYMAN GETS TWO YEARS *

A 35-year-old Tampa nurseyman convicted of stealing $570 worth of amaryllis bulbs from another nurseyman was sentenced to two years in prison yesterday.

Criminal Court Judge Carl C. Durrance imposed the prison term on Robert Lester Solomon, who operated a nursery with his parents at 3806 42nd St.

A jury found Robert guilty last October, but acquitted his parents, Mr. and Mrs. Horace Solomon. They were all accused of stealing 664 bulbs last March from August Bosserez, who operates Bosserez Nursery at 6215 North Himes Ave.

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* Reprinted from the Tampa (Fla.) Tribune, Jan. 23, 1962.

## EDITOR'S MAIL BAG

Mr. H. Speight, 4 Band Street, Lathlain Park, Western Australia, writes that he is interested in obtaining seeds of *Amaryllis* species in the Belladonna Group. He is a home gardener interested in the Amaryllis family and invites correspondence.

Prof. Douglas D. Craft, of the Chicago Institute of Fine Arts, who has served the Society faithfully as Artist since 1959 has had to curtail his load due to increased responsibilities at the Institute, and thus he has relinquished the position as Artist for the Society. However, he continues his interest in the Society and the amaryllids. The Society owes him a debt of gratitude for his excellent art work for the covers and plates in the Amaryllis Year Book in the past. His articles on amaryllid culture are also much appreciated.

We are pleased to announce that Penrith Brien Goff, Assistant Professor of German, University of Chicago, has assumed the duties as Artist relinquished by Prof. Craft. Prof. Goff's first artistic contribution appears in the present issue.

Miss F. Weber, Dip. Hort., M. A. C., Wiri, R. D. 1., Manurewa, Auckland, New Zealand, writes that she is interested in Nerines and other amaryllids, and invites correspondence.

Mr. and Mrs. W. R. Collings, 1300 Crescent Drive, Midland, Michigan, visited with the editor on January 23, 1962. The enjoyable visit was all too short.

On March 4, 1962, the editor enjoyed a visit from Mr. and Mrs. Lewis Lloyd, 4516 D'Hemecourt St., New Orleans 19, La. The Lloyds are enthusiastic amaryllid growers.

Mr. Zvi Ginsburg-Gazit, of Gevim Bulb Nursery, Gevim, Doar-Na Hof Ashkelon, Israel, writes under date of April 2, 1962, that the following amaryllids are native to Palestine: *Sternbergia spofforthiae, S. colchiciflora, Pancratium maritimum, P. parviflora* (=*Vagaria parviflora*), and possibly *P. sickenbergii, Ixiolirion montanum, Narcissus tazetta,* and *N. serotinus.*

William Morris, 20 Mills St., Warners Bay, New South Wales, Australia, writes under date of May 22, 1962, that he has started on work leading to the Master of Science (M. Sci.) degree at the University of New South Wales, having chosen as a beginning a survey of the Australian Crinums for their alkaloid content.

Mr. E. A. Angell, of Loma Linda University, Calif., visited the editor on May 28, 1962, bringing two very large bouquets of the Angell Strain of *Amaryllis* hybrids which he developed over a 24-year period from two original bulbs . . . . . . the value of this work is to reveal what species originally went into the large-flowered *Amaryllis* hybrids as shown by the characters in the progeny. The flowers show evidence of at least eight species—*Amaryllis belladonna* L. (color); *A. vittata* (vittate color pattern fragrance); *A. psittacina* (color pattern); *A. pardina* (pardina color with minute dots); *A. aulica* and *A. correiensis* (color and shape); *A. reginae* (shape and color); and *A. calyptrata* (yellow-greenish cast in some flowers). The Angell hybrids are generally 4-flowered, but some have up to 6 flowers in the umbel.

The editor received a most enjoyable visit from Mr. & Mrs. A. J. Haydel of New Orleans, La., on July 1, 1962.

We are sorry to report that Mr. C. J. van Til, general manager, and his wife, director and principal shareholder, of Ludwig & Co., were killed in September 1961, in a motor car accident. The remaining sorrowing members of the firm are carrying on. An outstanding new Amaryllis clone will be named 'Happy Memory' in fond remembrance.

Mr. G. E. de Vries of the Atlantic & Pacific Bulb Distributors of Savannah & Atlanta, Bulb Importers, representing Howie's B. C. Buller South African strain of Hybrid Amaryllis, writes under date of Sept. 29, 1962, that the firm will have a *very limited* number of high quality bulbs (vegetatively propagated clones), sizes 26, 28, 30 & up c. m. (=circumference), available on the basis of reservation in *early spring*. Those interested should write directly to the firm—A. & P. Bulb Distr., Box 225, Savannah, Ga. This firm also handles American and Dutch hybrid seedlings—A. & P. Bulb Distr., 3479 Rockhaven Circle, N. E., Atlanta 5, Ga.

Mr. Arthur Hoerl, 4321 Vantage Ave., North Hollywood, Calif., writes that he grows many *Haemanthus katherinae* bulbs and usually harvests many seeds which he offers to share with the other members. Those interested should write directly to Mr. Hoerl.

Mr. Rory McEwen, born in Scotland in 1932, great-great-grandson of John Lindley, the renowned English botanist; educated at Eton and Cambridge (honors in Literature); served two years as officer in Cameron Highlanders; art editor of ''The Spectator'' for three years; collaborated with Sacheverell Sitwell on a book of ''Old Pinks and Carnations''; and who lives and works in London, staged an exhibit of Amaryllis and other floral paintings, Nov. 27 to Dec. 22, 1962, at Durlacher Bros. Gallery, 538 Madison Ave., New York City. Those interested in acquiring such paintings should write directly to Mr. George Dix, owner of the Durlacher Gallery, or to Mr. McEwen at 9 Tregunter Road, London S. W. 10, England.

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[**PLANT LIFE LIBRARY**, continued from page 154.]

TREE GROWTH, edited by T. T. Koszlowski. Ronald Press, 15 E. 26th St., New York 10, N. Y. 1962. Pp. 442. Illus. $12.00. This important book includes symposium papers by a large number of authorities on various topics relating to the growth of trees, including the physiological mechanisms, environmental influences, and methods of measuring growth; and also growth correlations, historical events, silvicultural implications, and tree improvement. This outstanding book is highly recommended.

ORNAMENTAL SHRUBS OF CALIFORNIA, by L. Enari. Ward Ritchie Press, 1932 Hyperion Av., Los Angeles 27, Calif. 1962. Pp. 214. Illus. Paperback. $5.95. The purpose of this book is (a) to provide a means of identification of 277 native and/or introduced ornamental shrubs grown in California; and (b) to stimulate research on taxonomic problems concerning them. The botanical descriptions, reinforced by the 181 line drawings, have been prepared from living material and have been checked with the published accounts. A comprehensive key precedes the descriptions. Highly recommended.

THE COVERED GARDEN, by K. Lemmon. Museum Press, 26 Old Brompton Road, London, S. W. 7, England. 1962. Pp. 284. Illus. 30/- net. The English term "Covered Garden" as used here is equivalent to "gardening under glass" or "greenhouse gardening" in American English. The author traces the evolution of gardening under glass from the beginnings in ancient Greece and Rome to the orangeries and hot-houses in Europe of the 17th and 18th centuries, and on to later developments up to the present time: the techniques of glass-house construction and maintenance—glass, heating, ventilation and shape. The reader is introduced to the "Age of Grace", the "Conservatory Era", the role of plant hunters, the "Jungle pool", and "Orchidaceous Beauty", and "Decline and Fall". The book ends on the note of the glasshouse of the future. Highly recommended.

[**PLANT LIFE LIBRARY**, continued on page 36.]

# 1. REGIONAL ACTIVITY AND EXHIBITIONS

## RECORD-BREAKING FREEZE, JAN. 11-12, 1962

[The record breaking freeze of January 11-12, 1962 in the New Orleans, Houston, and Hattiesburg areas made it necessary to cancel some of the Official Shows scheduled in the spring.—*Editor*]

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THE GARDEN CIRCLE OF NEW ORLEANS.—The Official Garden Circle Amaryllis Show was canceled because some of the members, including the writer lost Amaryllis bulbs that were not protected. Potted plants that were heavily mulched and in an inclosure were completely frozen. In many cases bulbs planted in the open with crowns exposed were heavily damaged, but bulbs with crowns below the surface were not damaged. The latter bloomed very late and thus could not have been used as show material. In the past we were among those staging outstanding Official shows, we preferred canceling instead of having an inferior showing.

We are planning an outstanding Official Garden Circle Amaryllis Show in 1963 and the tentative dates for this Show are April 6-7, 1963. We are looking forward to many beautiful horticultural specimens and arrangements which will be open to all Garden Clubs and individuals.

—*Mrs. A. J. Haydel, Show Chairman.*

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THE HOUSTON AMARYLLIS SOCIETY.—The Official Show of the Houston Amaryllis Society had to be canceled in 1962 due to the unusually hard and prolonged freeze at a crucial period in the development of the plants and thus reduced the number of prime Amaryllis flower scapes essential to maintain the usual high standards for our exhibits.

The Society has completed plans for the 1963 Spring show and will follow its usual practice of adhering to standards which reflect the values wanted by the local group and the National organization.

—*Mrs. Frances G. Boone, Corresponding Secretary.*

## OFFICIAL AMARYLLIS FORUM OF MOBILE SHOW 1962

ROBERT E. PARKER, JR.

The high point of the 1961-62 year for the members of the Amaryllis Forum of Mobile was their second annual competitive amaryllis show held on April 21 and 22, 1962 at the Kate Shepherd Elementary School, under the direction of R. E. Chason, Chairman, and Russell Ludlow, Co-Chairman.

Despite record-breaking low temperatures during the winter, a large number of entries were received in the various classes in the open competition. The theme of the show was ''In Old Mobile'' in keeping with the two hundred and fiftieth anniversary of the city which had been celebrated the previous summer in various community activities.

The theme table (see Figure 4) was dramatically displayed with a single vase af amaryllis blooms of various kinds—on either side of the centerpiece were holders displaying the six flags under which Mobile has lived.

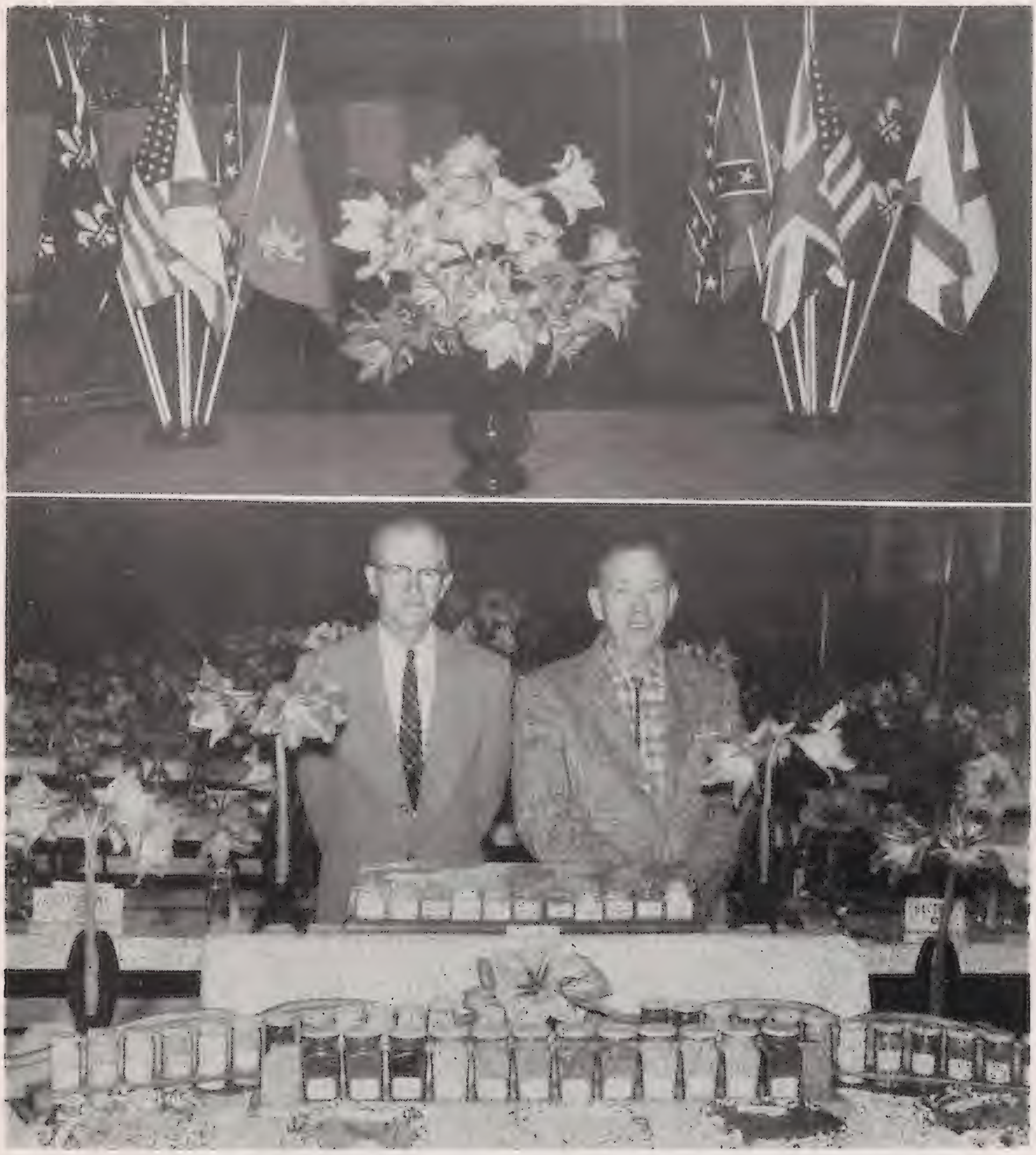

Fig. 4. Amaryllis Forum of Mobile—upper, theme table 1962 Show, flags represent the nations under which Mobile has lived. Lower, educational display; shown are the chairmen of the Show (see text), with the special winter study on soils.

There were four major divisions, with some ten classes, in the competitive sections, including artistic arrangements. There were also individual hobby tables prepared by members to add to the decor of the show and to exhibit the range of varieties within the respective hobbyists' collections.

An important non-competitive feature of the show was the educational display on soil and soil components, with special emphasis on texture of soil and the elements, both primary and secondary and the trace elements. (See Figure 5 which shows the display table. Shown are Russell Ludlow on the left and W. A. McCollum who were responsible for the winter study on soil).

Judging was by official Amaryllis judges and the trophies, which were awarded this year for the first time, went to W. A. McCollum, Club Trophy for best potted American Amaryllis; H. R. Young, Greer's Trophy for best cut specimen of American Amaryllis; Mrs. H. A. Allen, Club Trophy for best potted Dutch hybrid by color; Mrs. A. B. Palmer, Hammel's Trophy for best potted Dutch hybrid; and Mrs. Earl Parker, Courtney Memorial Trophy for best cut specimen of Dutch hybrid by color.

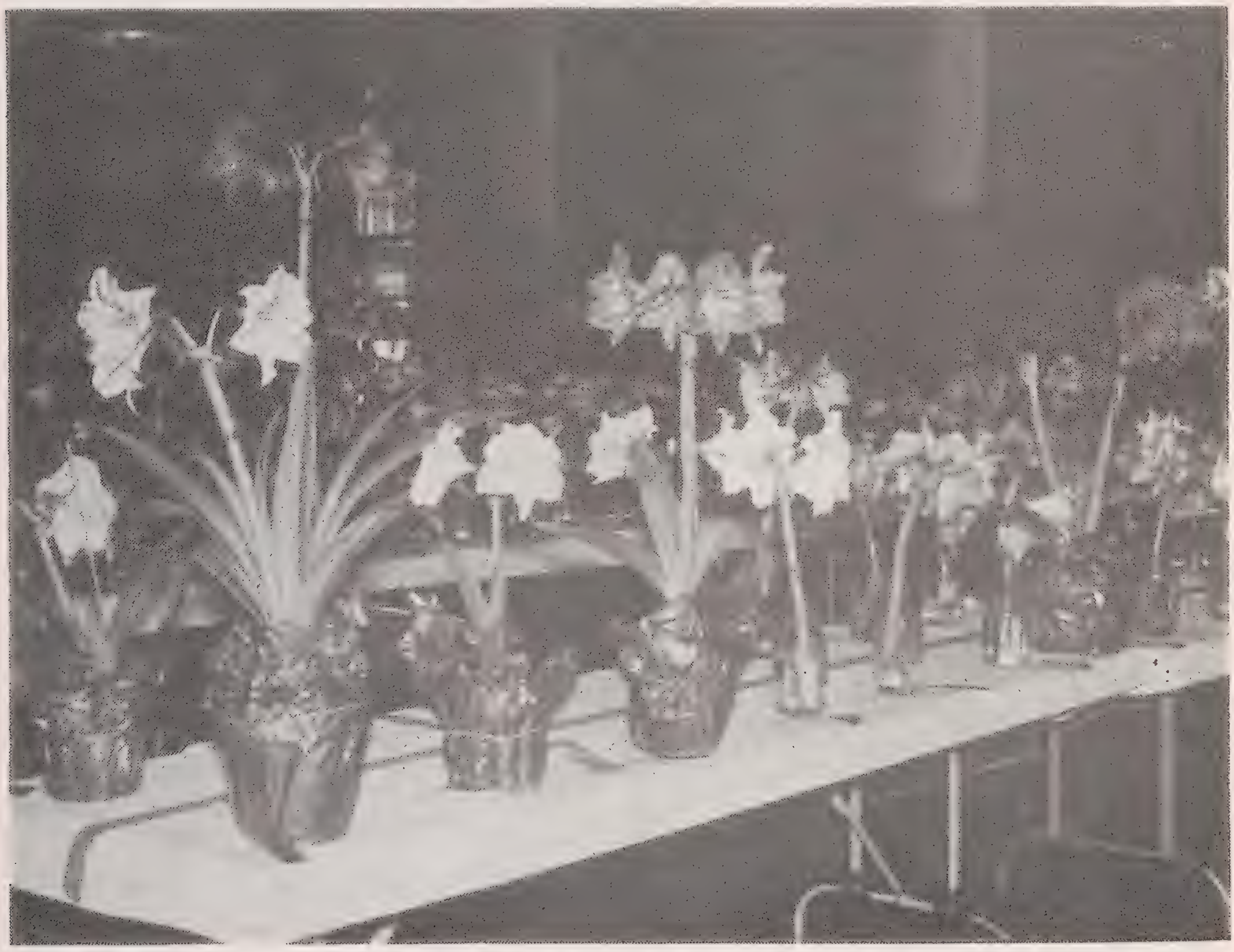

Fig. 5. Amaryllis Forum of Mobile—general view of the competitive section showing part of the entries at the 1962 Show.

Other trophies were awarded to Mr. W. T. Brown, Russell Ludlow Trophy for best cut specimen of Dutch hybrid by named clone; Mrs. C. D. Dean, President's Trophy for best new seedling; Mrs. H. A. Allen, Swetman Challenge Cup for best novelty or miniature; and Mrs. Russell Ludlow, Club Trophy for best artistic arrangement.

Special awards were given to Mr. and Mrs. Robert E. Chason and to Mr. and Mrs. W. A. McCollum for their hobby table displays, also the Men's Garden Club of Mobile received two (2) special awards for their attractive table display. The Swetman Sweepstakes Trophy was won by Mrs. Earl Parker for the most blue ribbons in the show.

As can be seen from the listing above, there were a very large number of trophies awarded which heightened the enthusiasm and added to the spirit of friendly competition. (See Figure 5 for a general view of the competitive section.)

The retiring officers of the Amaryllis Forum are W. O. Cobb, President; W. A. McCollum, Vice-President; Mrs. Ellen Boe, Secretary, and R. E. Chason, Treasurer.

## OFFICIAL AMARYLLIS SOCIETY OF MOBILE SHOW, 1962

Mrs. J. A. Brown, Jr., *Secretary*

The focal point carried out the theme of the show, a large globe of the world suspended from the ceiling surrounded by baskets of Amaryllis in the background.

The Amaryllis Society was under the leadership of Miss Mildred Laughlin as President, 1961-1962.

The members of the Amaryllis Society of Mobile, Alabama suffered a very great loss in the extreme 7 degree weather we had here in Jan. of 1962 and it seemed almost impossible to stage a show, but the members decided to put on a show to be as good as possible. To the delight of all members and every one who saw our show on April 14th and 15th, it was the best we had ever staged.

There were seven new Trophies added this year making twenty in all.

Swetmen Amaryllis Garden of Gautier, Miss., awarded to the winner of the most blue ribbons in the combined Dutch Hybrid potted and cut division a large silver tray with handles.

Robert Hiram Swetmen Memorial Trophy was awarded to the winner of the most blue ribbons in the Dutch Hybrid potted amaryllis division—silver tray with handles.

Wesley J. Marshall, Sr. Memorial Trophy was awarded to the winner of the most blue ribbons in the Dutch Hybrid cut amaryllis division—silver tray with handles.

The following annual trophies were awarded:

The Swetmen Challenge cup for most blue ribbons in the Dutch named clones division—sterling silver cup.

The Amaryllis Society of Mobile Hobby Trophy for most outstanding Hobby collection of Amaryllis—silver cup.

The Amaryllis Society of Mobile Trophy was awarded for the most blue ribbons in the unnamed cut seedlings division—silver sandwich tray.

The Amaryllis Society of Mobile Trophy was awarded for the most blue ribbons in the unnamed potted seedlings division—silver sandwich tray.

Our show had many beautiful artistic arrangements (of amaryllis only) and an Art exhibit for both seniors and juniors; with trophies awarded to all classes.

The general show chairman, Mr. Wilmer Smith, was assisted by Mr. J. W. Hanelein, Mr. Maxwell Stewart and Mr. Fritz Templin as co-chairmen. Mr. W. R. Lowe was master of ceremonies.

Fifteen accredited judges judged our show and awarded twenty trophies.

The Amaryllis Society of Mobile, Alabama with a membership of about one hundred is now making plans and looking forward to 1963 and a bigger and better show.

A welcome awaits every one who visits us at any time, but especially when we stage our 1963 show, which will be about the middle of April. That time of year seems most favorable for our Amaryllis.

## OFFICIAL CORPUS CHRISTI AMARYLLIS SHOW, 1962

Mrs. Carl C. Henny, *Secretary*

The Coastal Bend Amaryllis Society held its third Official Amaryllis Show in conjunction with the Lola Forrester Flower Show April 7th and 8th, 1962. The Lola Forrester Flower Show of Corpus Christi, Texas is held each spring, with thirty three or more garden clubs within the city participating. The Theme this year was "The Seven Lively Arts".

Mr. R. E. Raasch served as president of the Coastal Bend Amaryllis Society for the year. Mr. and Mrs. R. E. Raasch were in charge of the staging of the Amaryllis Show. Mr. and Mrs. Charles Sanders served as chairmen of the Placement Committee. All members assisted by serving on the various committees. The club consists of twenty members; many of them outstanding growers of hybrid amaryllis. Most of our bulbs are garden grown, with many seedlings being planted. Also many hybrid amaryllis bulbs are ordered from Ludwig & Co., Holland.

The Amaryllis Exhibit was open to members of all Corpus Christi Garden Clubs and also to residents of the city who were interested in growing amaryllis. Long tables were used to display the potted amaryllis and cut scapes. One hundred and fifty entries were made. Blooms on display were divided according to color, ranging from white, pink, salmon to the deepest of red.

Mr. Reed Rogers, Coastal Bend Amaryllis Society Member, received the Ludwig Challenge Trophy given for having received the greatest number of blue ribbons in the Amaryllis Section; a Silver Trophy for the "Queen of the Show"—named 'Apple Blossom'—for displaying the highest scoring registered amaryllis and also a Silver Trophy for the highest scoring "Cut Scape" of a garden grown amaryllis.

Mr. Fred Jones received a Silver Trophy for the highest scoring "Seedling" entered in the show. Three "Awards of Merit" and six "Preliminary Commendations" were awarded to participants for outstanding entries within the Amaryllis Exhibit.

The number of entries in the various classifications were as follows:

| | | |
|---|---|---|
| Class 79-A | —Registered Amaryllis, pot grown Leopoldi Type | 13 |
| Class 79-B | —Registered Amaryllis, Pot grown Reginae Type | 1 |
| Class 80-A | —Breeders Class—Seedlings: cut scapes | 50 |
| Class 81-A | —Garden Grown Amaryllis, Registered and named plants: cut scapes | 20 |
| Class 81-B | —Unnamed plants, cut scapes | 48 |
| Class 82-B | —Belladonna Type; cut scapes | 9 |
| Class 83-A | —Miniature Type—Pot Grown | 1 |
| Class 83-B | —Miniature Type—Garden Grown, cut scapes | 1 |
| Class 84-A | —Species—Pot Grown | 1 |
| Class 84-B | —Species—Garden Grown—cut scapes | 4 |
| Class 85 | —Australian amaryllis, cut scapes | 2 |
| | TOTAL NUMBER OF ENTRIES | 150 |

Members of the Coastal Bend Amaryllis received *13* Blue Ribbons; *13* Red Ribbons, *12* Gold Ribbons and *8* White Ribbons for their entries, making a total of 46 ribbons received.

Mr. Reed Rogers, winner of the Ludwig Trophy, entered the following named Ludwig Amaryllis specimens: Apple Blossom, Bouquet, Helen, Margaret Rose, White Giant, Picotee, and Love's Desire—cut scapes.

The Accredited American Amaryllis Society Judges who judged our show were: Mrs. Jesse Haver, Mrs. A. L. Hammond and Mrs. R. H. Schmuck—all from Houston, Texas. They were very pleased with our exhibit and said that it was one of the best they had ever judged.

Despite the advent of Hurricane Carla during September, 1961, and a three-day freeze during January, 1962, everyone was amazed with the many lovely hybrid Amaryllis specimens entered in the show.

## OFFICIAL VALDOSTA AMARYLLIS SHOW, 1962

VIRGINIA CULPEPPER

[The following report is based on an article by Virginia Culpepper which appeared in the Valdosta Times, April 16, 1962.]

Termed an outstanding success by all who attended was the 6th Annual Official Valdosta Amaryllis Show held on Saturday and Sunday afternoons (April 14 and 15, 1962) at the Garden Center Auditorium.

The Official Show was held in cooperation with the American Amaryllis Society, and was sponsored by the Men's Garden Club of Valdosta. It drew visitors from several near-by cities in Georgia and north Florida, and was well attended.

Mr. Robert D. Goedert, foremost commercial dealer in Amaryllis of Jacksonville, Fla., commented that the exhibit of blooms was worthy of any show of its kind in the South or on the West Coast. Among the other distinguished visitors was Mr. Sam Caldwell, the well-known horticulturist of Nashville, Tenn.

Awards were made in Class I. Named clones in pots (horticulture); Class 2. Unnamed seedlings in pots (arrangements); Class 3. Named clones as cut scapes (horticulture); Class 4. Unnamed seedlings as cut scapes (arrangements); and Class 5. Hybridizer's Class, seedlings in pots (horticulture). A special award was made to the only commercial exhibitor, Mr. Robert D. Goedert, who also donated imported bulbs to winners in the Court of Honor. McDonald Nursery also received a commendation for the attractive setting of the Show which included blooming orange trees in redwood tubs and other evergreens.

Mr. Hulyn Smith, President of the Men's Garden Club, and Guy Rice, Show Chairman, both stated that they were well pleased with the Show and the interest displayed by the public. ''Let's grow more Amaryllis next year'' was the comment heard on all sides by those viewing the blooms.

The judges of the Amaryllis Show were honored on April 14 at a luncheon given by Mr. and Mrs. Guy Rice at their home on Gornto Road.

## OFFICIAL HATTIESBURG AMARYLLIS SOCIETY SHOW, 1962

MRS. V. J. LUCAS, *Hattiesburg, Miss.*

The theme of our 1962 Official Show was ''determination.'' In spite of rain, sleet and snow, the members staged a Show.

Sweepstakes award was made to Mrs. Johnnie Jackson who won ten blue ribbons. Mrs. Ruth Bethea won the award for the most outstanding Dutch type seedling. Mrs. Leonard Broom won in the potted Dutch hybrid class with 'Wyndham Hayward', and in the Indian Dutch hybrid class with 'Fairy Queen'.

Mrs. Johnnie Jackson was the winner in the potted American hybrid class. Miss Donna McCaffery won the sweepstakes in the junior division with five blue ribbons.

Awards of Merit were awarded to Mrs. L. Bond, Mrs. M. W. Lancaster and Mrs. Johnnie Jackson. Silver trophies were given to all top winners. The Judges praised the quality of the blooms exhibited.

## THE GREATER HOUSTON AMARYLLIS CLUB

MRS. W. S. WHEELER, *President*

The Greater Houston Amaryllis Club was organized in June 1962 with 19 charter members, and with a membership limit of 25. All members are also members of the American Amaryllis Society which is affiliated with the American Plant Life Society.

We meet once each month in the homes of the members and view the gardens of its members. We are planning a Show in the spring of 1963, weather permitting. Mrs. W. S. Wheeler is President, and Mrs.

Walter D. Wells has been appointed Official Show Standards Chairman in order to keep informed on the proper procedure for staging Official Shows. We have five accredited Amaryllis Judges in our present membership. Some of our members have been growing Amaryllis for twenty years or more.

# MEN'S AMARYLLIS CLUB OF NEW ORLEANS 1962 SHOW

HENRY P. FONTCUBERTA

The Fifth show of the Men's Amaryllis Club of New Orleans was held on April 7th and 8th, 1962, at the Edward Hynes School, 990 Harrison Ave., and in spite of the cold winter we had a good amount of entries. Comments indicated the show was a huge success. Registered attendance was five-hundred-and-fifty-six (556), but we estimated about seven-hundred (700) to eight-hundred (800) viewed the show. The show was also viewed by many out-of-town visitors from Baton Rouge, Prairieville, Hansville, Luling, Thibodaux, Raceland, Belle Chase, Bastrop, Shreveport, Covington, Destrehan, Port Sulphur, in Louisiana. There were visitors from out of the state, too,—Mobile, Ala., Kansas City, Mo., Timmonsville, S. C., Gautier, Miss., Lincoln, Mass., Schofield, Wis., Dana, Ill., Chicago, Ill., and London, England.

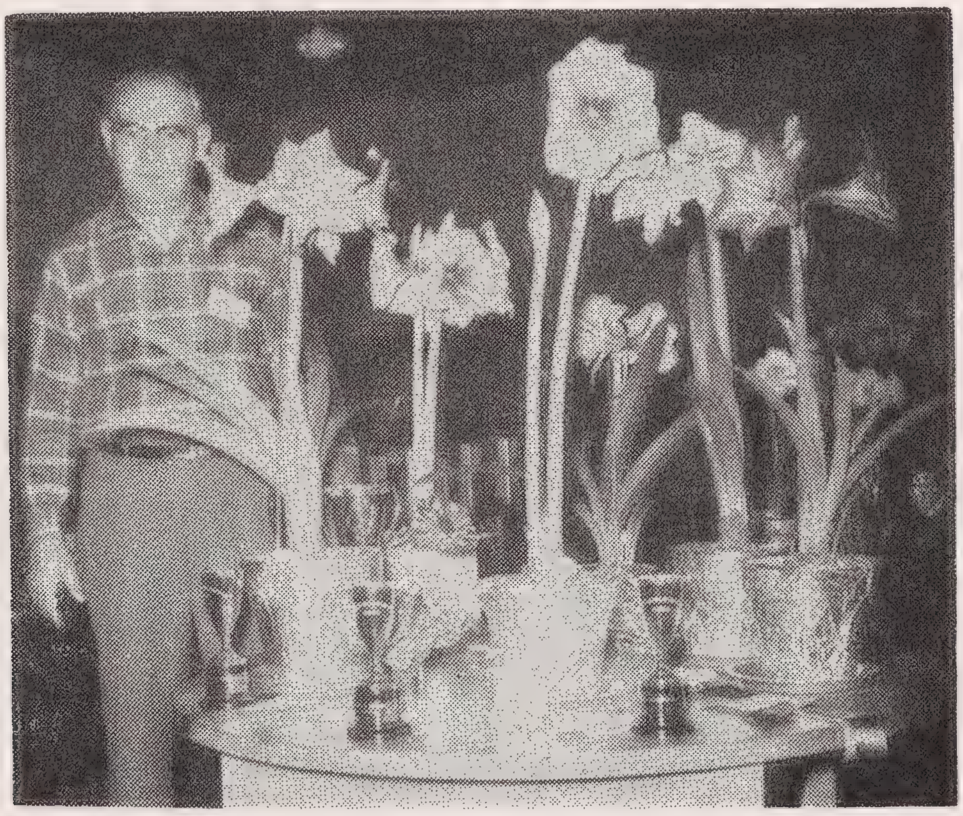

Fig. 6. Mr. W. R. Latapie; and grand prize table, Men's Amaryllis Club of New Orleans Show, 1962.

Awards in the *Horticulture Section* were received by: Walter R. Latapie—Steckler Seed Co. Award of Merit (Dutch); Walter R. Latapie—Reuter Seed Co. (Sweepstakes); Tim Calamari, Jr.—Newsham Becnel Award of Merit (American); Milo Virgin—Men's Amaryllis Club Award (Most blue ribbons won by a member); Stephen Gasperecz—Men's Amaryllis Club Award (Outstanding Seedling); Walter R. Latapie—Sweepstakes Ribbon (Dutch Class); Edward Authement and Tim Calamari, Jr.—were tied for the Sweepstakes Ribbon, American Class; Ribbons were awarded for First, Second, Third and Honorable Mention winners.

Awards in the *Arrangements Section* were received by: Walter R. Latapie—Men's Amaryllis Club award (scapes with two florets); and A. J. Haydel—Men's Amaryllis Club Award (single florets).

Mr. Frederic Schmitz, Assistant Professor of Horticulture, Plaquemine Parish Experimental Station, Diamond, La., showed colored slides and held discussions on Amaryllis, which were enjoyed by all who viewed the show on Sunday afternoon, the 8th.

Chairman of the show was Henry P. Fontcuberta. Co-chairman: Walter R. Latapie.

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## AMARYLLIS JUDGES CERTIFICATES

Since the last report in the 1962 Amaryllis Year Book (pages 25-26), the following named Amaryllis Judges Certificates have been issued by the American Amaryllis Society.—

103. Mrs. Roy T. Sessums, 125 Magnolia Drive, Metaitie, Louisiana (Horticulture only).
104. Mrs. M. E. Shelton, 1856 Willow, Liberty, Texas.
105. Mrs. E. H. Blankenship, 811 LeGrun, Houston 8, Texas, (Horticulture only).
106. Mrs. Leon G. Cox, 5643 Edith, Houston 36, Texas (Horticulture only).
107. Mrs. R. L. Culpepper, 2824 Lockett, Houston 21, Texas (Horticulture only).
108. Mrs. Joe B. Faries, P. O. Box 589, Liberty, Texas (Horticulture only).
109. J. R. Gebhart, 432 Euclid Ave., Houston 9, Texas (Horticulture only).
110. Mrs. David W. Hallam, 731 Kuhlman Road, Houston 24 ,Texas (Horticulture only).
111. Mrs. J. H. Tabony, Jr., 3713 Gulf Street, Houston 17, Texas (Horticulture only).
112. Mrs. K. Virgie Fortier, 5919 Paris Ave., New Orleans 22, La. (Horticulture only).
113. Mrs. Paul Merritt, 523 Turquoise St., New Orleans 24, La. (Horticulture only).
114. Mrs. E. J. Radke, 1319 Burbank Drive, New Orleans 22, La. (Horticulture only).
115. Mrs. J. C. Holderith, 5835 Chamberlain Drive, New Orleans 22, La. (Horticulture only).
116. Mrs. John J. Kieffer, 6501 Wuerpel St., New Orleans 24, La. (Horticulture only).
117. Mrs. W. Alvin Caserta, 5900 Chatham Drive, New Orleans 22, La. (Horticulture only).

## ADDITION TO SECTION II. FLORAL ARRANGEMENTS

The following classes have been added to those already admitted in this Section:

Explanation.—There are now many unnamed and unregistered Amaryllis bulbs being put on the market. It would be unfair to allow these to compete with the registered clones admitted in Section I. HORTICULTURE, and thus this addition has been made to accomodate these in Section II. FLORAL ARRANGEMENTS by allowing exhibits in groups with separate entries for cut scapes and potted plants. Such exhibits in groups may receive first, second or third prize ribbons on the same basis as those given to the regular floral arrangements in Section II.

(A)* 3 to 5 of the same kind (all identical)
  Class a.* Cut scapes
  Class b.* Potted plants
(B)* More than 5 of the same kind (all identical), not included under (A)
  Class c.* Cut scapes
  Class d.* Potted plants
(C)* 3 to 5 all different
  Class e.* Cut scapes
  Class f.* Potted plants
(D)* More than 5 all different, not included under (C)
  Class g.* Cut scapes
  Class f.* Potted plants

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* These letters may be changed to other letters or numbers so as to fit into any show schedule.

**[PLANT LIFE LIBRARY,** continued from page 26.]

PLANTS: AN INTRODUCTION TO MODERN BOTANY, by V. A. Greulach and J. E. Adams. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1962. Pp. 557. Illus. $7.50. This outstanding new text by authorities on the subject was written for students who specialize in botany, and also for those who pursue it as part of a liberal education. The text has a refreshing new look, and is in four sections: (1) economic botany—kinds of life; (2) levels of plant organization—molecular, cellular, tissue, organ, and organization and community; (3) plants in action—plant physiology and physiological ecology, and (4) individuals and lineages—reproduction, heredity, evolution and origin of life. This attractive text is highly recommended.

THE PHOTOSYNTHESES OF CARBON COMPOUNDS, by Melvin Calvin and J. A. Bassham. W. A. Benjamin, 2465 Broadway, New York 25, N. Y. 1962. Pp. 127. Illus. $6.00. This report on organic syntheses associated with the carbon reduction cycle in unicellular algae is based largely on experimental evidence obtained in the authors laboratory. The topics discussed include—carbon reduction cycle of photosynthesis and evidence in support of this; the carboxylation reaction; balance among synthetic pathways; photosynthesis vs. other forms of biosynthesis; amino acid synthesis; carboxylic acids; carbohydrates; fats; pigments; aromatic nuclei; other biosynthetic products. This book is highly recommended.

**[PLANT LIFE LIBRARY,** continued on page 55.]

# 2. LINEAGICS

[DESCRIPTION, CLASSIFICATION, EVOLUTION, AND PHYLOGENY OF LINEAGES]

## AMARYLLIS STARKII SP. NOV.

Ira S. Nelson and Hamilton P. Traub

Bulbs of this plant were collected in Bolivia by the senior author in 1958, when not in bloom. They bloomed in 1960, 1961 and 1962 at the University of Southwestern Louisiana Ornamental Horticulture Center.

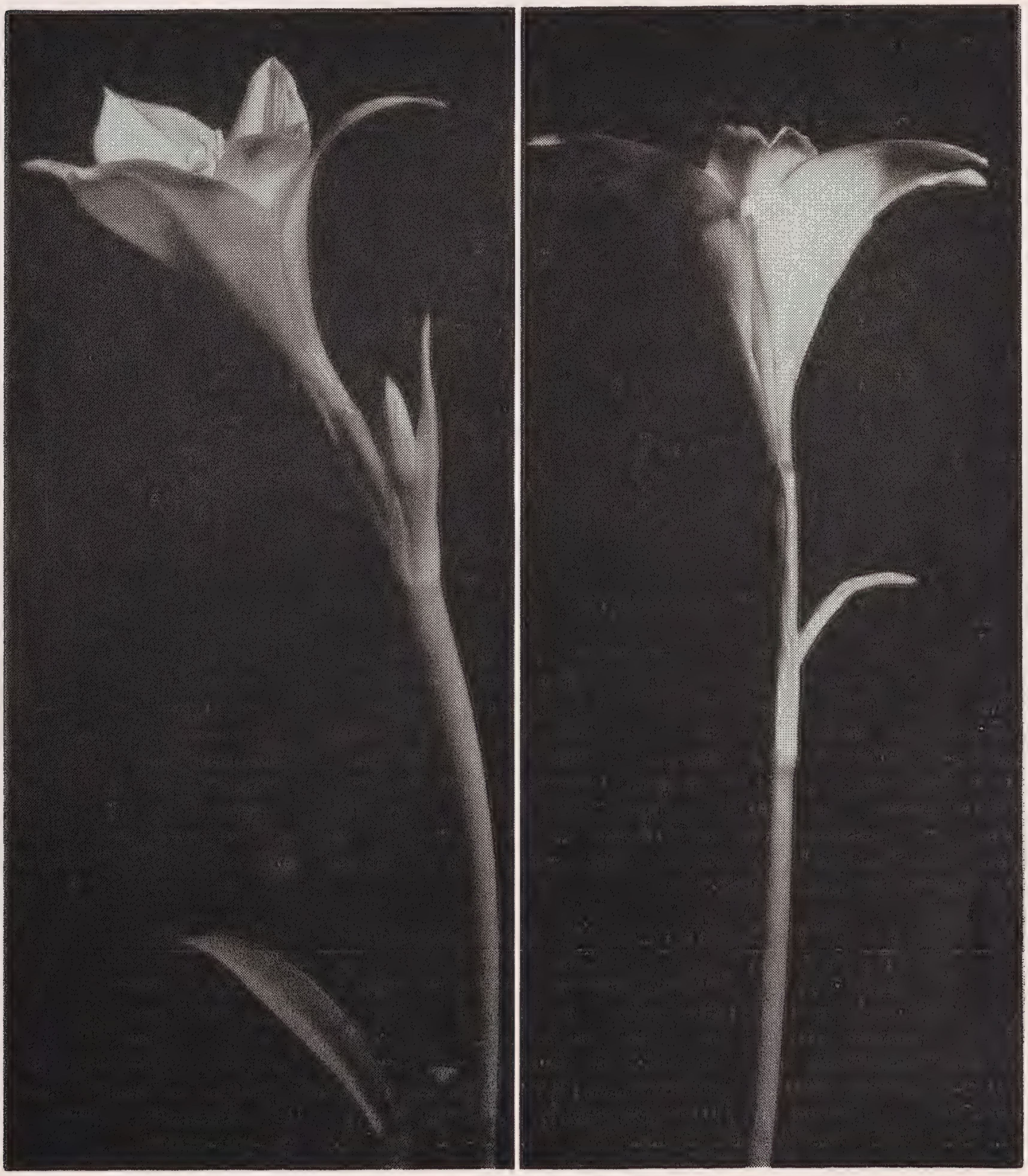

Fig. 7. *Amaryllis starkii* Nelson & Traub, *sp. nov.*, 1- and 2-flowered scapes.

A scape in flower, bulb and leaves were shipped air mail to the junior author in March 1962 for identification. Its suberect posture, subactinomorphic perigone, the relatively small bulbs, and the glaucescent leaves set it off from the rest of the *Amaryllis belladonna* Alliance, and it represents an undescribed species. It is remarkable that small bulbs may produce scapes with a single flower, but the same bulbs after another year's growth may produce scapes with 2-, 3-, or 4-flowered umbels. It is also characterized by the relatively short, stout tepaltube, and other particulars as indicated in the full description.

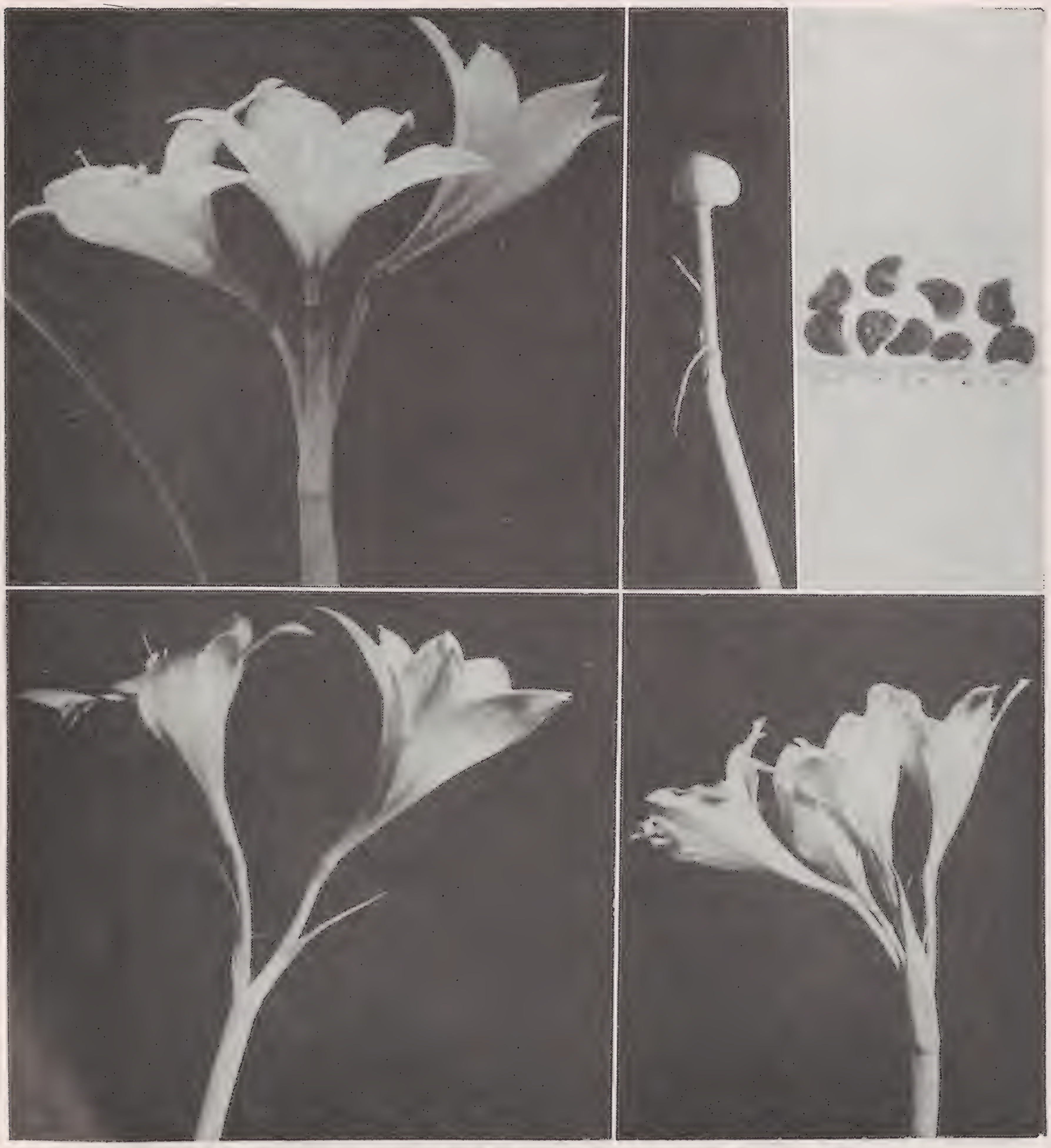

Fig. 8. *Amaryllis starkii* Nelson & Traub, *sp. nov.*, 2-, 3- and 4-flowered scapes; capsule and seeds in upper right.

The flowers of this species are long lasting (up to 9 days in cultivation), and it should thus prove valuable in breeding hybrid Amaryllis which will produce sub-regular flowers with sub-erect posture.

The new species has been named for Mr. and Mrs. H. J. Lutcher Stark, of Orange, Texas, in recognition of their contributions for ornamental plant explorations, and as a token of esteem in which they are held by the authors.

### **Amaryllis starkii** Nelson & Traub, **sp. nov.**

Bulbus globosus; foliis lanceolato-loratis glaucescentibus; scapo subcylindrico; spatha 2-valvata lanceolata; umbella 1- vel interdum 2—4-flora; pedicellis 2.5 cm. longis; ovario 3-loculato, ovulis per loculo multis; tubo tepalorum crasso 1.8—2.2 cm. longo; perigonio infundibulariforme suberecto; segmentis tepalorum subactinomorphis 6.4—8.2 cm. longis, 2.2—4 cm. latis; staminibus paulo infra apicem tubi tepalorum insertis, paulo declinato-adscendentibus, quam stylo paulo brevioribus; stigmate capitato breviter trilobato; capsula 3-loculata multiseminata; seminibus D-figuratis planis.

*Roots* heavy-fibrous to 5 mm. in diameter close to bulb and tapering to tips, well branched 10 cm below bulb, white. *Bulb* globose somewhat flattened longitudinally, to 7.5 cm in diameter, 5.5 cm in height, white. Neck very short, to 1.2 cm long. *Leaves* glaucescent, mostly present at anthesis, 2 to 7, lanceolate-lorate narrowing toward base then widening again at base, to 39.5 cm long, to 3.0 cm wide at base, to 2.2 cm wide at narrowest point, to 3.5 cm wide at widest point 1/3 of length below apex, tapering to bluntly acute apex, flattened V in cross section. *Scape,* sub-cylindrical, somewhat more flattened toward base and at attachment point of spathe valves, hollow, 18.5 cm to 25.6 cm long, 1.0 cm to 1.3 cm in diameter at base, 6.0 mm to 8.0 mm in diameter at apex. *Spathe valves* 2, lanceolate, erect, very light greenish-yellow with infolded margins which shrivel at anthesis, 10.0 cm long, 0.9 cm at base. Several filamentous bractioles present. *Umbel* usually 1-, sometimes 2—4-flowered. *Pedicels* 1.7 cm to 2.5 cm long, 0.4 cm in diameter. *Ovary* 0.8 cm to 1.0 cm long, 4.0 mm to 7.0 mm in diameter, roughly triangular in cross-section. *Tepaltube* stout, widening at apex, 1.8 cm to 2.2 cm long, 1.1 cm to 1.4 cm in diameter at apex, green tinged. *Perigone* funnel shaped, nearly erect, declined at approximately an angle of 12.5°, limbs spreading but not recurved, tepalsegs overlapping for lower ¾ of their length. It is among the most regular-flowered species found in the genus—the perigone appearing sub-actinomorphic; delicate satiny azalea pink (RHCC-618/1) or "strong reddish orange" (Nickerson Color Fan 7.5 R 6/12) in color on inside and outside; throat whitish with greenish-bands, nearer to white in center of the throat, with greenish white in between. *Paraperigone* absent, or nearly so, *Tepalsegs* oblanceolate, highly regular. *Setepalsegs* mucronate, upper seg 6.4 cm to 8.1 cm long, 3.4 cm to 4.0 cm wide, Lower two segs 6.8 cm to 8.2 cm long, 3.5 cm to 3.7 cm wide. Two upper petepalsegs 6.4 cm to 7.6 cm long, 2.4 cm to 3.2 cm wide. Bottom seg 6.6 cm to 7.8 cm long, 2.2 cm to 2.7 cm wide. *Stamens* 6, inserted 2 mm below apex of tube, filaments 3.9 cm to 4.5 cm long, white to greenish below, colored same as the perigone above; fasciculate, only slightly declinate-ascending. Anthers 5.0 mm long, pollen bright yellow. Stamens shorter than style and not exserted beyond the perigone. *Style* 7.6 cm to 8.8 cm long, colored as the perigone. *Style* extending about 7 mm beyond the stamens, and not exserted from the perigone. *Stigma* capitate, very shortly 3-lobed. *Fruit,* 3-celled, many-seeded capsule, 2.9 cm in diameter rupturing at maturity. *Seed,* flattened, D-shaped, very thin and paper-like, turning black at maturity, to 1.3 cm long, 0.9 cm wide. *Cytology,* somatic chromosome number 2n=22. *Habitat,* 950 m altitude. Growing in light sand-humus mixture which overlays gray bedrock to a depth of 40 cm or more, partial shade exposure. Rainfall seasonal, temperature mild, frost free throughout the year. *Range* extent not known, type colony relatively small, does not exceed 100 clones in the immediate vicinity of a place known locally as the "Natural Arches" about 3 Km southeast of Santiago, Bolivia.

# AMARYLLIS CHIONEDYANTHA SP. NOV.

MARTIN GARDENAS, *Bolivia*

This species was collected by J. Saavedra at Cueva de Monos when he was traveling from Rio Sajta to Puerto Villarroel. We received the plants from him for our *Amaryllis* collection. This species is related to *Amaryllis fragrantissima* (subg. Macropodastrum) previously described in Plant Life by the present writer. It differs from this however in its longer flower, which is the longest among *Amaryllis* known to us, in its clearly cylindrical tepaltube and the yellow-greenish spathe valves.

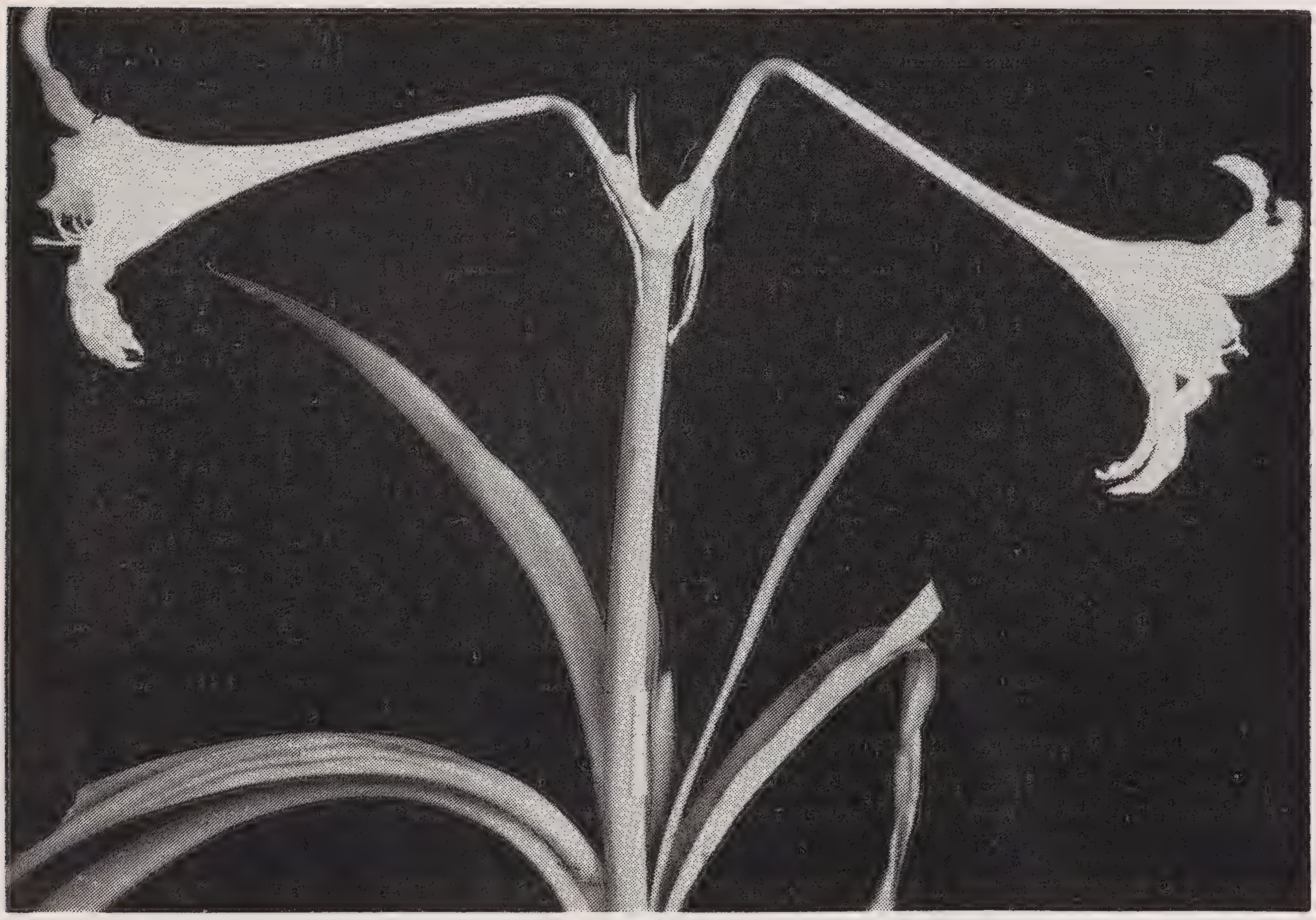

Fig. 9. *Amaryllis chionedyantha* Cardenas, *sp. nov.*, plant in flower, side view.

**Amaryllis chionedyantha** Cardenas, **sp. nov.**

(Macropodastrum) Bulbo magno, 10 cm. long. Pseudocollo brevi, crasso. Foliis plus minusve 12, deorsum deflexis 35-55 cm long., 5-5.5 cm latis. Scapo 40-50 cm long., basim 2-3 cm crasso, glauco viride. Umbella 2 flora. Bracteis spathaceis 11-14 cm long., diluto viridibus. Pedicellis 4 cm long., viride albescentibus. Floribus 28-30 cm long. Ovario cylindrico 1.5-2 cm long., 7 mm crasso, trigono, curvato, atro viride. Tubo 10-14 cm long., 7 mm crasso supra ovarium, inferne viridiscenti, superne niveo. Setepalsegmentis lanceolatis 15 X 3 cm, mucronatis in labro undulatis, niveo albis. Petepalsegmentis lanceolatis 13.5 X 2.5 cm, deflexis in ore undulatis, niveo albis. Staminibus 9-12 cm long. Filamentis albis. Antheris 1 cm long.

curvatis. Stylo plus minusve 11 cm long. albo. Stigma trifida. Lobis 7 mm long. albis.

Patria: Bolivia: Provincia Carrasco, Cueva de Monos in itinere Antahuacana—Rio Sajta, 500 m.

Herbaceous 50—60 cm tall plant. Bulb large, 10 cm long with a short and thick neck. Leaves distichous about 12 deflexed 35-55 cm long, 5-5.5 cm wide, fresh green. Scape 40-50 cm long, grayish green, 2-3 cm thick at base and 2 cm thick at the apex. Umbel 2 flowered. Spathe valves 11-14 cm long, yellow greenish. Pedicels 4-6 cm long, 8 mm thick, very light green. Flowers 28-30 cm long, 19-20 cm limb. Ovary dark green, trigonous, curved, cylindric, 1.5-2 cm long, 7 mm thick. Tepaltube 10-14 cm long, 7 mm thick at base, white greenish below, snow white above. Setepalsegs lanceolate, mucronate, undulate at the borders, 15x3 cm, pure white. Petepalsegs uneven. Laterals lanceolate 13.5 X 2.5 cm. Lower one narrower, 2 cm wide. All petepalsegs snow white and curled at the edges. Stamens inserted at the tube apex, 9-12 cm long, curved at the apex. Filaments pure white. Anthers 1 cm long, curved, yellow. Style not longer than stamens about 11 cm. long, white. Stigma trifid with 7 mm long white lobes.

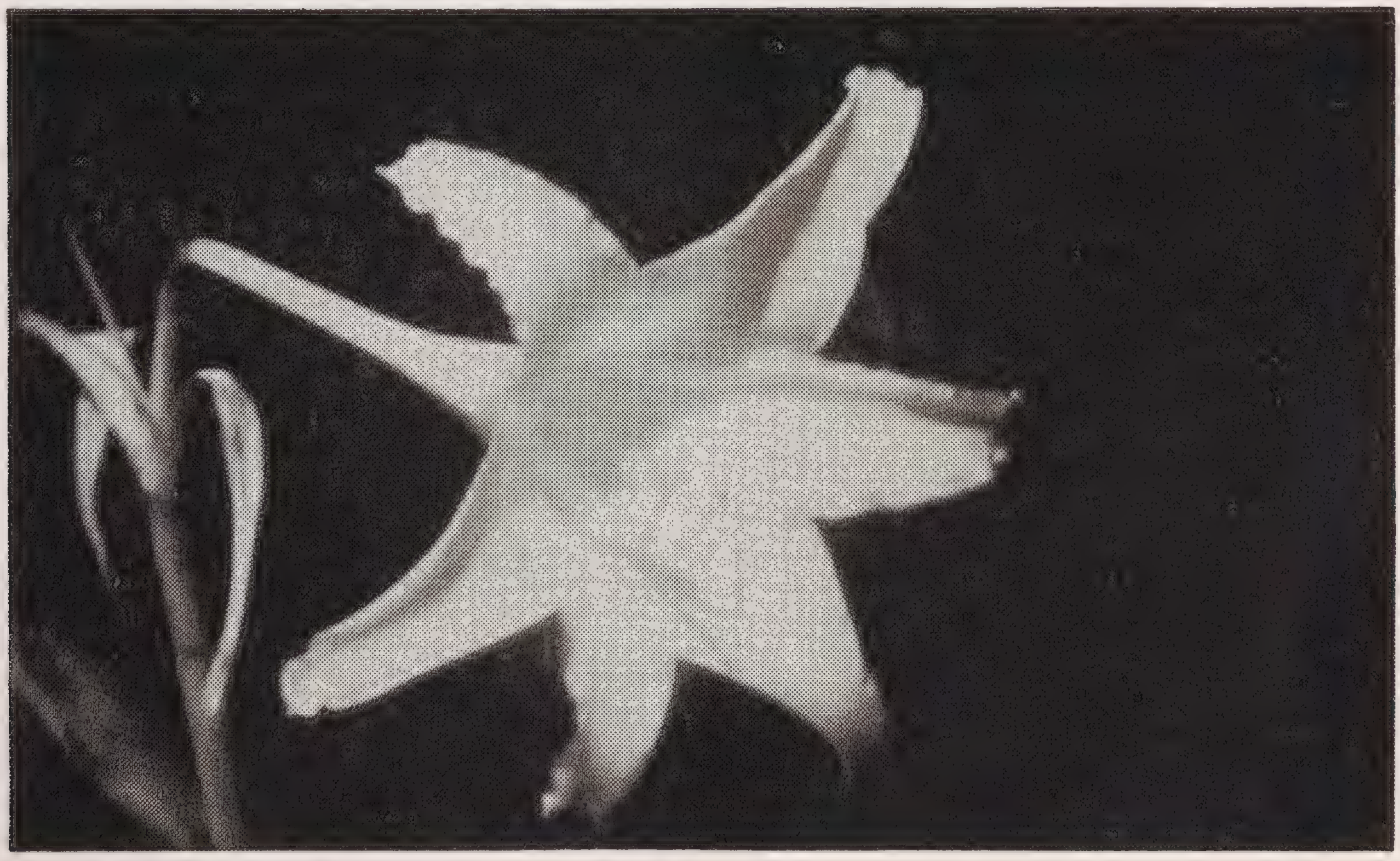

Fig. 10. *Amaryllis chionedyantha* Cardenas, *sp. nov.*, view into flower.

Bolivia: Province of Carrasco. Department of Cochabamba. On the way from Antahuacana to Rio Sajta. Cueva de Monos J. Saavedra, June 1958. Holotype (nomenifer): No. 5541, in Herbarium Cardenasianum. See Figs. 9 and 10.

# HYMENOCALLIS VENEZUELENSIS TRAUB, SP. NOV.

HAMILTON P. TRAUB

On May 30, 1962, Blydenstein (no. 390 = US 2,370,539) collected a *Hymenocallis* species new to science at Estero de Camaguán, State of Guárico, Venezuela, where it is "Fairly common in low wet areas during the first weeks after the start of the rainy season. The leaves die off after the flowers wither."

**Hymenocallis venezuelensis** Traub, **sp. nov.** (Amaryllidac.)

Bulbus globosus; foliis linearibus; scapo usque ad 34.5 cm. longo; spatha lanceolata; umbella 5-flora; ovario sessile globoso; ovulis per loculo 3 vel 4; tubo

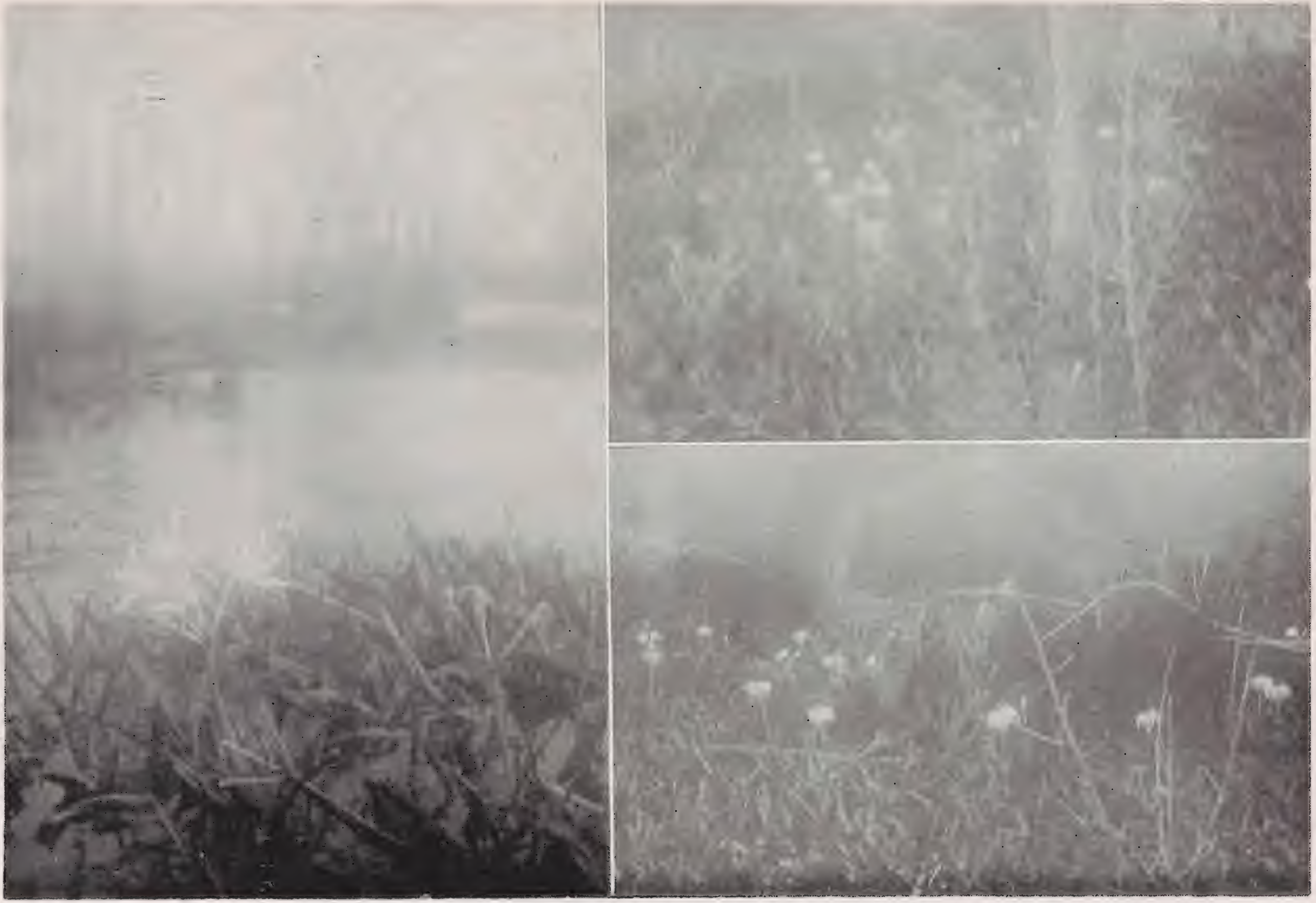

Fig. 11. Right, upper and lower, **Crinum strictum**, on the Neches River, in Jefferson County, on the southeastern edge of the City of Beaumont, Texas, in a small bayou.

Left, **Crinum strictum** var. **traubii**, in overflow swamp on east side of Neches River, in Orange County, within the City limits of Vidor, Texas.

Photos taken on a cloudy day, by Mrs. Carl Shirley.

tepalorum 8.2—8.5 cm. longo; segmentis tepalorum linearibus 7.8—8.2 cm. longis, 0.5 cm. latis; cupula staminorum infundibulariforme 3.5—4 cm. longa; filamentis 2.7 cm. longis; antheris versatilibus; stylo quam staminibus paulo longioribus; stigmate capitato.

*Bulb* 4.5 cm. long, 4.2 cm. in diam. (globose), neck 6 cm. long, 2 cm. in diam. *Leaves* several, linear, 26-33-36 cm. long, 1.4 cm. wide below the middle, narrowing gradually to a bluntly acute apex. *Scape* 34.5 cm. long, about 1 cm. in diam. in lower part, narrowing somewhat toward the apex. *Spathe* lanceolate, apex bluntly acute, or acute-truncate. *Umbel* 5-flowered. Lower 2/3 of tepaltube greenish, upper 1/3 yellowish-green, rest of flower white. *Ovary* sessile, globose, 1.3-1.8 cm. long, 0.9-1.0 cm. in diam.; ovules 3—4 per cell. *Tepaltube* 8.2-8.5 cm. long. *Tepalsegs* linear, 7.8-8.2 cm. long, 0.5 cm. wide, apex acute. *Staminal cup* funnel-shaped, 3.5-4 cm. long, margins rising about 0.5 cm. between the filaments, slightly irregularly incised. *Filaments* 2.7 cm. long. *Anthers* versatile, 1.5 cm. long, pollen greenish-yellow. *Style* slightly longer than the stamens; stigma capitate, bluntly 3-lobed.

Holotype (nomenifer): Blydenstein 390 = US 2,370,539, Estero de Camaguán, State of Guárico, Venezuela, May 30, 1962.

This species belongs in the Henryae Alliance, subg. *Hymenocallis*, genus *Hymenocallis* (see PLANT LIFE 18: 55-72. 1962). It is related to *H. praticola* but differs from this in having a longer staminal cup (3.5—4 cm. long), and shorter filaments (2.7 cm. long).

## ADVENTURES WITH NATIVE CRINUMS

Mrs. Carl Shirley,

*1540 Forsythe Street, Beaumont, Texas*

Many native Crinums and Hymenocallis can be found along the banks of the Neches River that separates Jefferson and Orange counties, in the central eastern part of Texas. Since childhood, I have been familiar with these ''spider lilies'' as they are known in this area. My Dad and I spent many hours on the rivers and bayous fishing from a boat and these were always blooming during the summer months. The term ''spider lilies'' covers both *Hymenocallis and Crinum* and few seem to have noticed the difference. *Hymenocallis* start to bloom very early in the season and the Crinums follow—from early July through November.

Some bulbs were collected in September, 1960 near the City of Beaumont, Texas, almost in sight of the skyscrapers (see Fig. 11). The City lies on the banks of this river. Dr. Traub has identified one sent him as *C. strictum*. Some were in bloom at the time. Later, we collected seeds, but I do not know if they were seeds of *C. strictum* or of *C. americanum* which is an earlier bloomer. Most of the seeds were large, with antenna-like tops.

To reach these, my husband, Carl, and I had to go by boat as there is no known road leading to any of the places where they are found. Otherwise, these would be inaccessible, as there is about six miles of swamp on the Orange County side of the river and it is really ''primitive,'' infested with cottonmouth moccasin snakes that will keep you in the boat. A few bulbs can be found scattered along the river banks, but usually are in small overflows from the river or up a little slough where they seem to seek protection, either from the cold or the waves from the boats going up and down the river. Without exception, these plants were on the North or East side of the banks, which puts them in Orange instead of Jefferson County.

The tides from the Gulf of Mexico affect this river. The bulbs are always covered with some water and at times completely covered, foliage and all. As the tides recede, the water level changes and rarely can one find them growing where there is no water over them. Salt water also backs up into the river and I am sure, at times, it is really ''brackish.'' It was found to be salty fourteen miles up the river recently.

The soil is heavy clay, black and mucky. Bulbs are usually barely covered to the neck, but some are about one-half out of the soil. We found only one place where you could get on the bank to collect them, and this was at low tide. We collected a few and Dr. Moldenke has identified them as *Crinum strictum* var. *traubii*. We did not venture over an area greater than five by ten feet. In this small area, we found tracks of deer, raccoon, mink, bobcats, nutria and others we could not identify. Evidently they had come to drink from the river.

It is my belief that *C. americanum, C. strictum,* and *C. strictum* var. *traubii* grow together as they are scattered blooms in most places at different times of the summer and fall. I will check these more closely next year and bring in more bulbs from different places to grow and further check the blooming season of each. The blooming time for *C. americanum* is early July to August; *C. strictum* apparently blooms in September; and *C. strictum* var. *traubii* flowers in October and November, and even later into December in cultivation in California.

We checked for bulbs up and down the river from the City of Beaumont for a distance of about ten miles or more. We found them to range that far. They are noticeably scarce along the most traveled part of the river, indicating they would be washed loose and float away from that area. My husband and a friend checked these by flying over them and they report that there are some deep into the swamp or marsh, but they could not tell whether they were crinums or Hymenocallis.

To collect them might take four or five trips before you can find them again. During the rainy seasons, the water in the river is up and they are covered. If the water is down, the tide might be in. So, they have to be checked when everything is just right. And you will decide to dig most of them without getting out of the boat!

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Under date of October 10, 1962, Mrs. Shirley writes:—

You asked for the locations of collection: Figs. 11, right, were of the pink ones which we found up a small bayou just in the southern edge of the City of Beaumont off the main course of the Neches River, on the east bank which would be apparently in Jefferson County and within the City limits. The others (Figs. 11, left) are from a greater distance in the overflow or swamp. This was across the main course, up a bayou just north of the City and on the Orange County side (considered part of the City of Vidor, Texas). Orange and Jefferson counties are separated by the Neches River and Beaumont is in Jefferson

County. The River runs almost due north and south. Vidor is east of Beaumont 6 miles, and the swamp is between them. The bulbs were found on the north side of the Bayou. There are a very few scattered bulbs on the south side of the shores. There they grow in water almost without exception. The tide affects even the bayous and the water may recede enough so that they are uncovered, but with the next tide they are again covered, at least a few inches, or up to 18 inches so that the leaves barely show.

# LOUISIANA CRINUMS

Barry W. Clark, *New Orleans, Louisiana*

We have been collecting native crinums for several years now, and have noticed some variation in *Crinum americanum.* This plant is generally of two different types in the wild. The first type is remarkably uniform in flowering and growth habits. The plants are small, compact with short leaves, and bear four flowers per scape. The plants generally bloom at one time.

The second type is much more variable in all respects. The individual plants may bloom from spring to late summer and each scape bears 2-4 flowers. Some plants have flowers with twisted and curled tepalsegs. The leaves are long and are of shaggy growth. We are growing both types under nearly identical conditions to determine if the differences are due to environmental conditions or represent natural variations.

Another type of *Crinum* collected is what we believe to be *C. strictum,* which has not been up to now reported as growing in Louisiana. This plant is not plentiful in the wild, but should be propagated so it could be widely cultivated. *C. strictum* is easily distinguished by its rough edged sub-erect leaves and the tepaltube which remains during seed maturation. Our plants differ from the previously described type plant in being larger with longer leaves and tall flower scapes.

There may be 2-5 or 7 flowers (var. *traubii*) on a 24 inch scape. No bulbs were observed with six flowers. In the wild only a few seeds are produced, but with hand pollination under cultivation, many more result.

Both of the above Crinums deserve to be more widely grown because of their open faced fragrant flowers which measure up to 9 inches in diameter and are pure white with carmine red stamens and style. Anyone who has Crinums surely should have these two in their collection, as they make an excellent show, especially when planted in masses.

## REFERENCES

Traub, H. P. Robust Form of Crinum Americanum? Plant Life, 1958, page 51.

Traub, H. P. Long Lost American Crinum Found. Plant Life, 1962, page 47.

# VARIATION IN CRINUM FLACCIDUM

### L. S. Hannibal

For some hundred years there has been considerable confusion over *Crinum flaccidum* Herb., and in several instances the plant has been keyed out and published with the caption of *C. pedunculatum*, a *Crinum* which resembles *C. asiaticum*. The confusion increased when a number of variants were recently collected and flowered in Australia. The general trend of the discussions indicated that there was difficulty concerning the subgenera classification—Whether the flowers exhibited bilateral symmetry as in subgenus *Codonocrinum*, or radial symmetry with lance like tepalsegs which identifies subgenus *Platyaster*. And to add to the confusion there was no agreement as to the arrangement of the stamens, whether spreading or if contiguous and declinate. Photographs indicated both conditions and also disclosed that the tepaltube lengths varied significantly, that some were slightly curved, and that in some the tepalsegs formed a funnel form arrangement while in others they opened flatly (patent) as in *C. americanum*. The one thing in common was the long slender recurving foliage which tends to drop down upon the ground. Preliminary surmises were that there were two or more similar species involved which belonged to different subgenera. The fact that white, pink, and yellow or cream colored blossoms were available tended to bear this out.

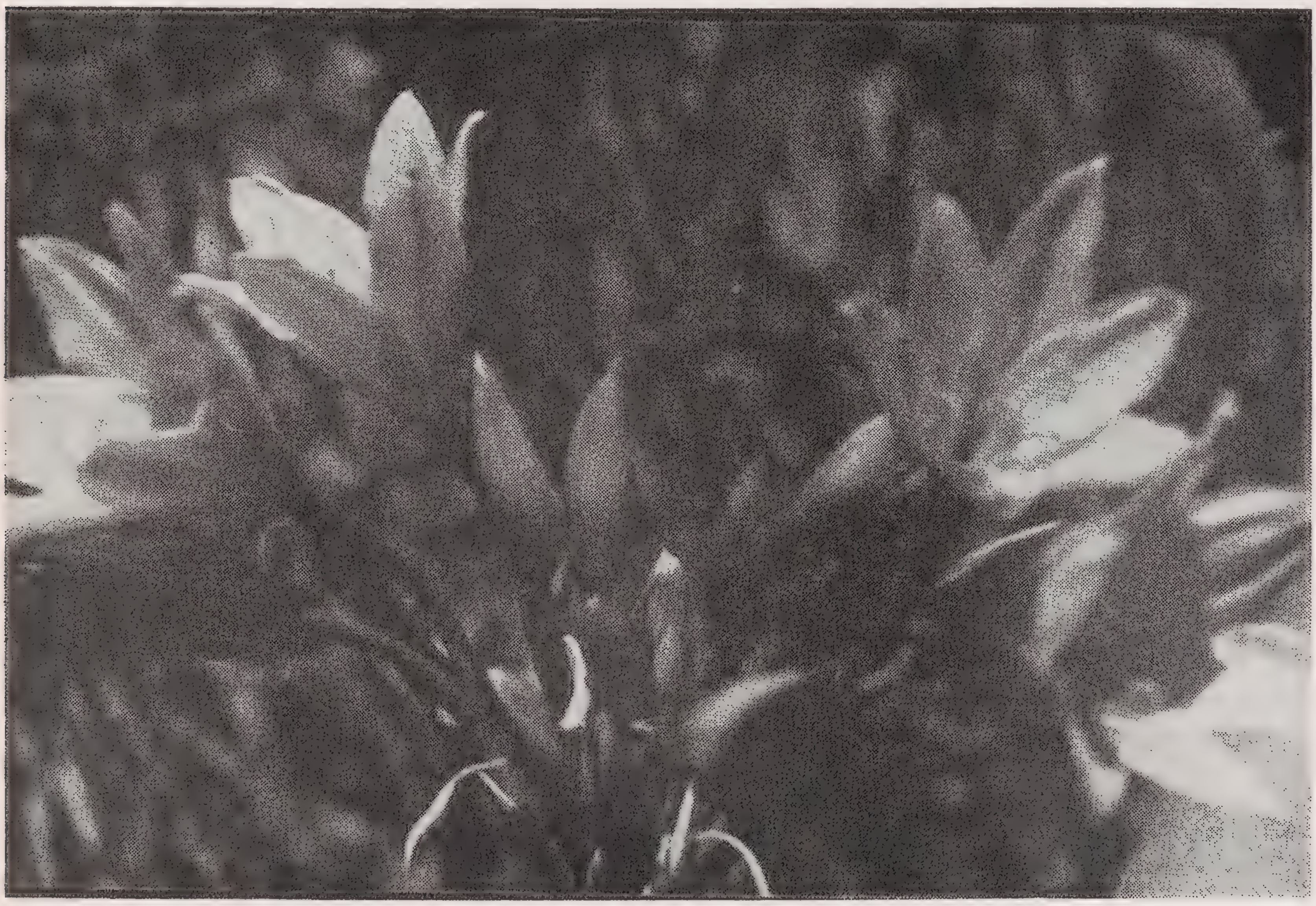

Fig. 12. *Crinum flaccidum*, yellow-flowering form, near Pichi-Richi Pass, Flinders Range, South Australia; spring growing and flowering.

Finally a yellow flowered form was flowered at the Los Angeles

Arboretum (Fig. 12), only to be followed by a bulb in the writers greenhouse. The latter was from an alkaline desert area some forty miles east of Adelaide. This plant had been the cause of much of the discussion regarding identity so it received close attention. It turned out to be variable in performance. The pedicel of the first blossom was barely a half inch long when the flower-bud opened and the tepaltube was scarcely two inches long. In place of being straight as expected the tepaltube bent sharply to the horizontal with a near 90 degree turn. The setsegs were semi-deciduous, and the petsegs opened flatly with spreading stamens. The second blossom repeated the unusual pattern except that the setsegs were better formed, but the bent tepaltube and spreading anthers were quite an oddity. Then the third blossom shot up and it had a six-inch tepaltube which was not curved. In place of the tepalsegs being patent, the limb was symmetrically funnelform complete with spreading anthers. The fourth blossom was like the third, but in this instance the stamens were contiguous and declinate. Was the plant subgenus *Platyaster* or *Codonocrinum?* The stamens were noted to be attached to the base of the limb in place of the apex of the tepaltube as occurs in *Codonocrinum.* The degree of development of the attachment area determined the arrangement of the anthers. As additional blossoms opened the variations of form continued. Temperature and sunlight were noted to have some influence on the strange behavior. Then photos of the bulb which flowered at the Los Angeles Arboretum's greenhouse arrived. The stamens were all spreading. Subsequently the writer has flowered several more bulbs and a reevaluation of collected species was made in Australia.

The possibility of several species or different subgenera being involved can be rejected. The species appears to belong to *Platyaster.* Numerous variants exist covering an area of 1500 miles diameter in scattered localities. Some forms grow on semi-bogland and others are adapted to the most arid of deserts. Two strains grow in alkaline soil with a pH of 8 to 9. All are fragrant, but some are near to sickening, particularly when conditions become humid at sundown. In the north along the Darling River basin (in New South Wales) the blossoms of Crinum *flaccidum* are completely patent. In some instances blossoms with declinate stamens prevail on some bulbs in place of spreading stamens. Often both flower types occur in the same umbel. Near Quirindi in N. S. W., plants have been found which have broad elliptical tepalsegs. In an adjacent area the tepalsegs are of varying shades of pink in place of white. The tepaltubes of all forms are long and erect. Most of the bulbs grow in overflow land and flower with the late summer rains.

In contrast the bulbs growing out in the desert east of Lake Eyre exhibit tepalsegs with an amber hue. Under the arid conditions the bulbs are found down some 30 inches away from the heat and nearer to moisture. Root systems spread twelve feet in diameter have been noted. Flowering occurs in the early spring when a heavy rain occurs. Since less than three inches per annum of rain falls, the bulbs often remain deciduous for several years.

Usually patent shaped blossoms with slender tepalsegs are found along the flood plains of the Murray River in South Australia. The prevailing color is white but amber is not uncommon. However the plants found growing up on the higher alkaline terraces tend to have funnel-form limbs and often display slightly curved tepaltubes. Those about Mannum are most representative. The most striking variant is the yellow flowered strain found growing in the rocky Pichi-Richi pass in Flinders range, which is 200 miles north of Adelaide. These bulbs have funnel-form blossoms with relatively short tepaltubes, and also seem to be quite hardy to our winter conditions. Of all the types this group appears to be most promising for California gardens.

Initial tests indicate that *C. flaccidum* is a good breeder. Crosses have been effected with *Crinum moorei* and *C. pedunculatum.* Dean Herbert crossed it with *C. asiaticum* sometime previous to 1835. Since our *C. americanum* is also a member of Subgenus *Platyaster* serious effort should be made to cross it and *Crinum flaccidum.* The combinations with either the pink or yellow *C. flaccidum* would be of particular interest and it is possible that the resulting hybrid would be fertile.

Further investigations are also in order in Australia, particularly in Queensland and the northern territory since several *Platyaster* forms may be subtropical variants of *C. flaccidum. C. pestilentis* unquestionably is a tropical variant of *flaccidum.* And finally an investigation of the species shown in Botanical Magazine 47: t. 2133, leads to the conclusion that the plant may not have had the proper growing conditions under glass in England and that the flower buds were never properly matured when they opened. This may have resulted in its classification as *Codonocrinum.*

The writer wishes to thank David Symon, Systematic Botanist of Waite Institute, and Dr. William Morris of the New Castle Hospital Biochemical Laboratory, for their generous assistance in the preparation of material which has made this study possible.

## ZEPHYRANTHES HOWARDII SP. NOV.

HAMILTON P. TRAUB

This plant was first found growing in Laredo, Texas, by Mr. Fred B. Jones on July 4, 1954. A specimen without leaves (No. 902-B, TRA) was received from him. Since there are various hybrids to be found in Texas, it was considered necessary to rediscover this plant in the wild if it were to be considered as a candidate for species rank. On one of his collection trips to Mexico, Dr. Thad Howard did actually find this plant growing in the State of Leuva Leon, in the mountains north of Monterey. He sent bulbs to the writer under date of May 14, 1956. When these bloomed on May 29, 1956, it was at once apparent that this plant was the same as the Fred B. Jones collection in Laredo, Texas. The plant comes nearest to *Zephyranthes concolor* but it differs from that species—the leaves are narrower, the flower is upright and somewhat smaller, the flower color is light yellow, the stamens are longer than the style, and there are other differences. Thus it is in fact a species new to science. It has been named in honor of Dr. Thad Howard who first collected the species in the wild, and is noted for his outstanding *Zephyranthes* hybrids, and for his amaryllid collecting trips into Mexico.

**Zephyranthes howardii** Traub, **sp. nov.**

Haec species a ''Z. concolor'' foliis angustioribus, floribus erectis leviter minoribus flavidulis, staminibus quam stylo longioribus, et caeteris characteribus differt.

HOLOTYPE: Traub No. 900 (TRA), 5-8-58, grown from bulbs collected in the state of Neuva Leon, Mexico, in the mountains north of Monterey in 1956. Paratypes: Traub No. 902-A, 5-29-56; and Fred B. Jones No. 902-B, 3-27-56.

## HYMENOCALLIS VELARDEI SP. NOV.

HAMILTON P. TRAUB

In October 1961, Dr. Joseph C. Smith of La Mesa, Calif., brought to the writer a plant in flower grown from a bulb collected by Dr. C. Vargas, Dept. La Libertad, Prov. Trujillo, alt. 500 m. in sandy places. Dr. Smith indicated that a specimen of it could be made for the Traub Herbarium. It was at once apparent that it was a species in the subgenus *Elisena* of the genus *Hymenocallis* and nearest to *H. longipetala.* A description was made from the living plant. Since it differed from *H. longipetala* in a number of characters it was considered as a new species. It would have been named for Dr. Vargas, but there is already *Hymenocallis* (sug. *Pseudostenomesson*) *vargasii* (Velarde) Traub, which had been named for Dr. Vargas by his colleague Dr. Velarde of the University Cuzco, Peru. Thus it has been named for Dr. Velarde.

**Hymenccallis** (subgenus Elisena) **velarde** Traub, **sp. nov.**

Haec species a ''H. longipetala (Lindl.) Macbr.'' praecipue pedicellis 6 mm. longis (vs. ovaria paene sessile), tubo tepalorum 5 mm. longo (vs. 6—9 mm. longo), segmentis tepalorum 7.4 cm. longis (vs. 10 cm. longis), cupula staminorum 2.4 cm. longa (vs. 3.8 cm. longa), et filamentis 5.2 cm. longis (vs. 6.4 cm. longis) differt.

Holotype: Dr. Joseph C. Smith no. 890a+b (TRA), 10-3-61, cult. La Mesa, Calif. grown from bulbs collected in Prov. Trujillo, Peru by Dr. C. Vargas.

The species differs from *H. longipetala* in having pedicels 6 mm. long (ovary nearly sessile), tepaltube 5 mm. long (vs. 6—9 mm. long); tepalsegs 7.4 cm. long (vs. 10 cm.); staminal cup 2.4 cm. long (vs. 3.8 cm.); and filaments 5.2. cm. long (vs. 6.4 cm.) long in *Hymenocallis longipetala* (Lindl.) Macbride.

# LYCORIS X LAJOLLA HYBR. NOV.

Hamilton P. Traub

In 1956, the writer made reciprocal crosses of *Lycoris aurea Herb.* and *L. traubii* Moldk. The first of these seedlings flowered in 1961 and flowers were again obtained in 1962. These plants promise to be useful ornamental garden plants. The characters of the parents are variously dominant in the F-1 generation—leaves glabrous, spathe ovate, pedicel short and with flower shape similar to *L. aurea.* In 1962 the flowers were selfed but only one seed has set. The second generation seedlings will be raised beginning with this one seed and additional seeds to be obtained in later years.

**Lycoris** x **lajolla** Traub, **hybr. nov.**

Planta inter "Lycoris aurea" et "L. traubii" in utramque partem hybrida; plantae generationis primae foliis glabris, spatha ovata, pedicellis brevibus, colore formaque sicut L. aurea.

The leaves are glabrous, spathe ovate, pedicels short, and flower shape and color is similar to that of *L. aurea.*

HOLOTYPE: Traub no. 880a+b, 9-13-61 (TRA), grown at La Jolla, Calif.

# EARLY BURSTING OF OVARY IN HYMENOCALLIS

Hamilton P. Traub

In connection with the exposition of his theory of the angiosperm flower, Melville (Kew Bull. *16:* 41. 1962) refers to "Gymnospermous Angiosperms". This condition is due to the rupture of the capsule by differential growth rates of its parts. Melville states that "such a lack of coordination of growth rates might be expected in the early evolution of a structure like that of the angiosperm ovary." He cites various examples. To this list might be added the genus *Hymenocallis* which is notorious in this respect. Unless the seeds are underdeveloped, the ovary walls are usually broken early in the development of the seeds which may protrude as a group so that the ovary wall is not noticeable. This is particularly true in *Hymenocallis mexicana* (L.) Herb. ex Druce, a dwarf species of easy culture which might be used as an experimental object for the study of lack of coordination of growth rates in ovary and seed development in angiosperms.

# LYCORIS SANGUINEA AND L. "CINNABARINA"

William Lanier Hunt, *North Carolina*

The existence of at least three different burnt orange lycorises in my collection makes me begin to wonder if it is not going to take quite some time and work to unscramble the sanguinea-cyrtanthiflora-koreana complex.

Two different lycorises have come to me from different sources as *L. sanguinea* Maximowicz. The first one has flattish tepalsegs which reflex slightly but have absolutely no crimping or curling. The head of flowers measures 7½ inches across. Pedicels are upright, 1½ inches long. Spathe valves are 1¼ inches long and ½ inch wide after drying. (See Fig. 13.) This flower looks very much like the illustration at Fig. 3 A, Traub & Moldenke, ''Amaryllidaceae: Tribe Amarylleae'', 179. 1949.

The other plant that came to me as *L. sanguinea* is only about a third of the size of the above described plant. The tepalsegs are not crimped nor reflexed, and the total result is that of a large bright deep apricot freezia. This is naturally a small plant as I have it because it is growing in rich soil and has flowered several times as a dwarf. A mass of these would be beautiful in the summer garden, but they are small and ephemeral. (See Fig. 13.)

*Lycoris* ''cinnabarina'' looks to me like what Col. Grey called *L. sanguinea cyrtanthiflora* Hort. Grey, Hardy Bulbs 2: 58. 1938. (See Fig. 13.) The color of this flower is ''burnt orange'' HCC-014/1, one of the most stunning colors imaginable. The main differences between this plant and the larger sanguinea described above lie in the slightly crimped tepalsegs, the reddish brown pedicels (They are green in *L. sanguinea*) and the much earlier blooming season. *L.* ''cinnabarina'' flowers several weeks (beginning as early as July 7th, 1962) earlier than the two types of *L. sanguinea.* In fact, they just barely overlap. As shown in Fig. 13, seeds have formed on *L.* ''cinnabarina''. This is the same scape shown by itself in flower in Fig. 13. The vases are 6⅝ inches tall.

By no stretch of the imagination can I get any of these three flowers to be ''brick red''. They are burnt orange or apricot to me. Only one, the little one, answers to the description of *L. sanguinea* as having ''segments that are neither crisped nor reflexed'' as old John Weather says in his reliable bulb book of 1911. No matter what the true *L. sanguinea* is like, we certainly have three distinct plants here.

It may even be possible that there are still other types. Among the several hundred bulbs I have, there is some strange looking foliage that singles it out from its fellows in March. The foliage of all these bulbs is, of course, contemporary with that of *L. squamigera.* It is shorter and more grey green than that of *L. radiata* though quite similar, with the typical ridge down the back. Incidentally, in with the different batches of *L. ''cinnabarina''* have come some *L. radiata* bulbs that flower at a different time from the season of any of the three types of *L. radiata* in my collection. These will bear watching for fertility possibilities.

*L.* ''cinnabarina'' is self fertile as will be seen by the seeds formed in the vase. There is no other amaryllid blooming at the time this flower opened except crinums. I have had a bitter contest with a little creature that looks like a bee. [See also Herbertia 3:111-112. 1936.—*Ed.*] It has been necessary to go out in the heat of the middle of the day or in late morning and collect pollen just before anthesis takes place because this little creature is apt to beat me to it if I am late. The minute anthesis takes place, he and his children are there gathering

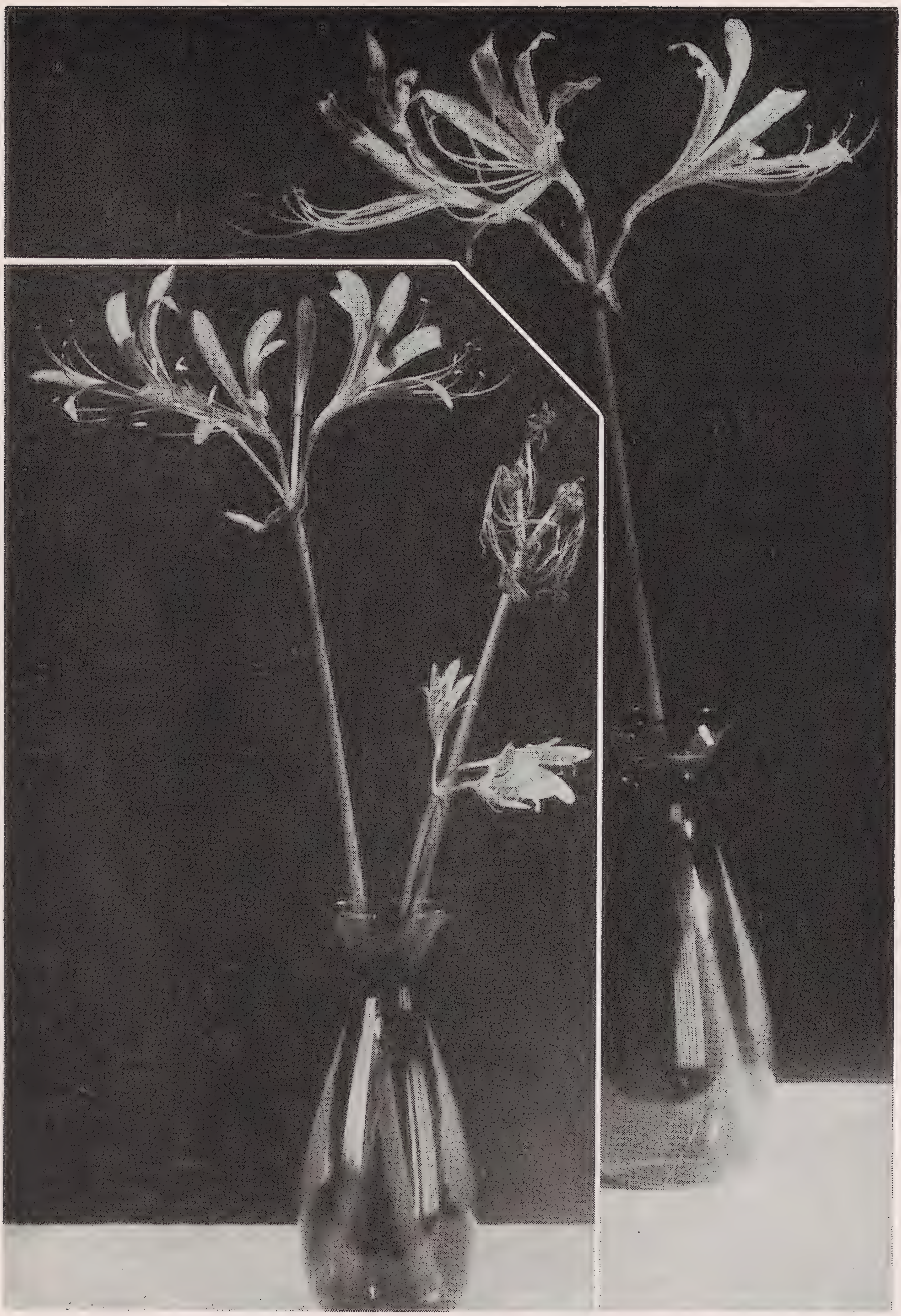

Fig. 13. *Lycoris* species: left, flower scapes—tall form, *L. sanguinea,* tepalsegs not crisped, pedicels green, July 29, 1962; dwarf form, *L. sanguinea,* tepalsegs neither crisped nor reflexed, July 27, 1962. Scape with seed pods—*L.* "cinnabarina", same as scape in flower to right, now gone to seed. Right, *L.* "cinnabarina", tepalsegs burnt orange and slightly crisped; pedicels brownish. July 7, 1962. The vases are 6⅝" high. Photos by William Lanier Hunt.

pollen and storing it on their ''hind'' legs. They are so greedy for it that they will almost allow me to close them up in the medicine capsules I use to store pollen. Again, as fast as pollen is brushed onto stigmas, the tiniest members of this insect family can light right on the stigma and steal it away. The larger insects have to alight in the flowers and climb out on the styles, but baby can snatch it off while flying by! If these little creatures were not so intriguing, more pollenating might be done. By repollenating the stigmas several times in the day, I seem to have overcome the difficulty because seeds have been produced right along.

Pollen of *L.* ''cinnabarina'' has inspired *L. squamigera* to produce lots of seeds this year—whether parthenocarpic or just dead seeds remains to be seen. Last year, after some 44 crosses on one of the new ''whites'', I harvested one healthy looking seed which failed, however, to come up. With a dessicator full of pollen, everything in sight is destined for pollenation from these beautiful burnt orange flowers this year.

The blooming performance of *L.* ''cinnabarina'' and the two sanguineas is not as good as it might be. They have been through five and three extra snowy, cold winters respectively here in middle North Carolina at 500 feet elevation. Temperatures were occasionally low in March at the time when the foliage is about grown. Low temperatures held back *Cyclamen repandum* nearby, and it seems that these lycorises were adversely affected. Only about one sixth of several hundred bulbs have bloomed, and the same has been true of *L. squamigera.*

Whatever these variations on the same theme turn out to be, they are welcome in the mid-summer garden in the South, for they are truly exotic. With any blue flowers like the veronicas, they are stunning. None of the brownish orchids is more beautiful or unusual.

## SPROUTING CLIVIA CYRTANTHIFLORA SEEDS

HAMILTON P. TRAUB, *California*

In the past, seeds of *Clivia cyrtanthiflora* were planted directly in a potting medium of 1/3 each of granulated peat, coarse sand and garden loam. In each case the seeds failed to sprout, and gradually decayed. A change in procedure was indicated.

On March 23, 1961, the writer harvested 17 seeds of *Clivia crytanthiflora.* These were placed in a plastic bag together with a quantity of vermiculite which had been sparingly wetted. The closed bag was placed in the garage and was forgotten. Recently, on July 15, 1961, the writer remembered about the seeds, and was pleasantly surprised to find that 16 out of the 17 seeds had germinated with leaves 2 inches long, and roots from 2 to 5 inches long. The seedlings were then planted in the potting medium previously described. The seeds had apparently sprouted some time previously, and normally would have been potted earlier.

The writer desired selfed seedlings of *Clivia cyrtanthiflora* in order to check the statements in the literature to the effect that this is a hybrid. If the seedlings will segregate in the direction of the reported parents according to the Mendelian ratios, then the hybridity of this plant can be established. If the seedlings come true to form, then the plant is apparently a true species and not a hybrid, unless parthenocarpy is involved. This latter possibility is unlikely however.

## CRYPTOSTEPHANUS VANSONII

Gordon McNeil, *South Africa*

*Cryptostephanus vansoni* Verdoorn was found by Georges van Son in 1935 in the Vumba Mountains of Southern Rhodesia. Baker places this genus near *Narcissus* due to the corona in the blossom, however the plant resembles a *Clivia.* It produces a thin flattened peduncle and the umbel of blossoms resembles that of *Tulbaghia fragrans,* particularly in the internal structure of the flowers. The segments are star shaped opening white and fading to a violet mauve. The fruit is a scarlet berry containing one or two spherical seeds some 3 mm. in diameter. The seeds take 18 months to ripen. Dr. Gouws reports the chromosome number as 2n=24. A few plants are grown for botanical interest at the Pole-Evans garden in Southern Rhodesia.

## AMARYLLID GENERA AND SPECIES

Harold N. Moldenke

[In this department the descriptions of amaryllid genera and species, particularly recent ones, translated from foreign languages, will be published from time to time so that these will be available to the readers.]

*Elisena sublimis* Herb. Bot. Mag. pl. 3873.—scape 9 inches tall; spathe 3 inches long, 6-flowered; peduncles ⅜ths to ¾ of an inch long; limb becoming whitish, 2 inches long, surpassing the filaments by ¾ of an inch; corona about ¾ of an inch long, acutely many-dentate; style subequaling the limb or finally surpassing it by half an inch; stigma minute. Specimen collected by J. MacLean in the Andes of Caxamarquilla.

*Hymenocallis adnata* var. disticha Herb. Amaryll. 215. 1837.—P. distichum Bot. Mag. 44 (1879) as to the plant of Herbert, not as to the illustration. The tepaltube and segments 4½ inches long, the leaves somewhat broader and more nervose.

*Hymenocallis crassifolia* Herb. Amaryll. 215. 1837.—From Port Saint Mary, western Florida, lat. about 29°. Leaves thick, suberect, lorate, obtuse, canaliculate, almost 36 inches long, 2 inches wide, green; corona of the perianth almost like that in *H. caribaea,* tepaltube longer.

*Pseudourceolina* Vargas, Bol. Facult. Sci. Univ. Cuszo, No. 1: 7-8. 1960. Bulb pyriform, 32—35 mm. long, 22—24 mm. in diameter, the neck 15—18 mm. long; leaves produced after the time of anthesis, similar to those of the genus Eucharis, acuminate, long-petiolate; scape to 14 cm. long, 2-flowered; pedicel long, slender, pendulous; perianth yellow, urceolate to 1/3 the height, and with the stamens similar to those in the genus Urceolina, but the tepals only connate half way up; free stamens equaling the tepals; gynoecium rather long. It differs from the genera Eucharis and Urceolina in its leaves and perianth. Type species, P. robledoana.

*P. robledoana* Vargas, l. c. Leaves 2, produced after the time of anthesis; petioles 6—8 cm. long, slightly alate; blade 12—15 cm. long, 8—9.4 cm. wide, acuminate, obscurely parallel-veined, the acumen 6—8 mm. long; flowering scape to 14.5 cm. long, 8 mm. wide at the base; bracts yellow, membranous, 30 mm. long, 4.5—5 mm. wide; umbel 2-flowered; pedicels pendulous, 3—3.5 cm. long; ovary pale-yellow, subglobose; perianth yellow, green at the apex, 4.5—5 cm. long, the tube narrow to 1/3 its length, 1—1.5 mm. wide, finally expanding and 18—25 mm. wide; tepals connate to the middle beyond that free; stamens exserted, narrow, yellow, free; anthers 2.5—3 mm. long; style longer than the stamens; stigma more narrow; fruit not seen. The species is dedicated to Luis Maria Robledo.

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Tribus *Traubieae* Moldenke, *tribus nov.*, genus Brunsvigia Heist. (Amaryllidac.)
Rhizoma bulbosa; foliis hysteranthis; scapo gracile usque ad 3.5 cm. longo; spatha bivalvata quam pedicellis longioribus; ovario inferiore 3-loculato, ovulis per loculo multis; tepalis 6 linearibus acutis patentibus, nervis 3 purpureis in centro ornatis; filamentis filiformibus purpureis quam tepalis dimidio brevioribus; antheris ad basin sagittatis quam filamentis vix dimidio brevioribus; stylo gracile purpureo quam staminibus paulo longioribus; lobis stigmatis vix aspectabilibus.

Typus: genus *Traubia* Moldenke, gen. nov. (Amaryllidac.)
Rhizoma bulbosa: follis hysteranthis; scapo gracile usque ad 3.5 cm. longo; spatha bivalvata quam pedicellis longioribus; ovario inferiore 3-loculato, ovulis per loculo multis; tepalis 6 linearibus acutis patentibus, nervis 3 purpureis in centro ornatis; filamentis filiformibus purpureis quam tepalis dimidio brevioribus; antheris ad basin sagittatis quam filamentis vix dimidio brevioribus; stylo gracile purpureo quam staminibus paulo longioribus; lobis stigmatis vix aspectabilibus.
Typus: *Traubia chilensis* (F. Phil.) Moldenke, *comb. nov.;* syn.—*Lapiedra chilensis* F. Phil., in Anal. Univ. Chile xciii: 144-145, Lam. VI. 1896.

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[**PLANT LIFE LIBRARY**, continued from page 36.]

TAXONOMY OF SETARIA (GRAMINEAE) IN NORTH AMERICA, by J. M. Rominger. University of Illinois Press, Urbana, Ill. 1962. Pp. 132. Illus. This monograph on the 43 species of the North American foxtail or bristle grasses incorporates the research reported in the literature of the past 40 years relating to the taxonomy, morphology, cytology, anatomy, geographical distribution and economics of *Setaria*. The author has studied about 6,000 pertinent herbarium specimens and has made field collections and observations in the course of the preparation of this monograph. Highly recommended.

FLOWERING TREES OF THE WORLD: FOR TROPICS AND WARM CLIMATES, by E. A. Menninger. Hearthside Press, 118 E. 28th St., New York 16, N. Y. 1962. Pp. 336. 425 Illustrations. $18.95. This book is based on experience gained from a quarter century devoted to the study of flowering trees for subtropical and tropical climates. In the present book, 500 of the finest flowering trees have been selected, and they are described, and many of them are illustrated in color or black and white. At the end of the book, valuable indices are included —flowering trees by special features, half-hardy trees, color of flowers, leaf color other than green, quickie guide for travelers, common and scientific names. This most attractive book is highly recommended.

COMPARATIVE PLANT ANATOMY, by Sherwin Carlquist. Holt, Rinehart & Winston, 383 Madison Av., New York 17, N. Y. 1961. Pp. 146. Illus. $5.00. This important new book is presented as a guide to taxonomic and evolutionary data in angiosperms on a comparative basis. After considering the ethics of comparison, the chapters are devoted to cellular components, epidermis and trichomes, xylem, phloem, vascularization of the shoot, root, histology of the stem, leaf, and flower and associated topics. This stimulating guide is highly recommended to all who are interested in the comparative anatomy of the angiosperms.

[**PLANT LIFE LIBRARY**, continued on page 62.]

# SOMATIC CHROMOSOMES OF **WORSLEYA RAYNERI**

Walter S. Flory and Thelma L. Schmidhauser,

*The Blandy Experimental Farm, University of Virginia*

The "Blue Amaryllis," long carried under the name *Amaryllis procera,* had its nomenclature reconsidered by Traub and Moldenke in 1949. At that time the taxon was given the new combination *Worsleya rayneri* (J. D. Hooker) Traub and Moldenke.

Traub had earlier (1939) established the monotypic genus *Worsleya,* separating it from the genus *Amaryllis* L. chiefly because of its four spathe-valves, rather than two; its D-shaped, rather than discoid, round or subglobose seed; and its bulb with a long aerial neck, rather than a bulb with no—or a very short—aerial neck.

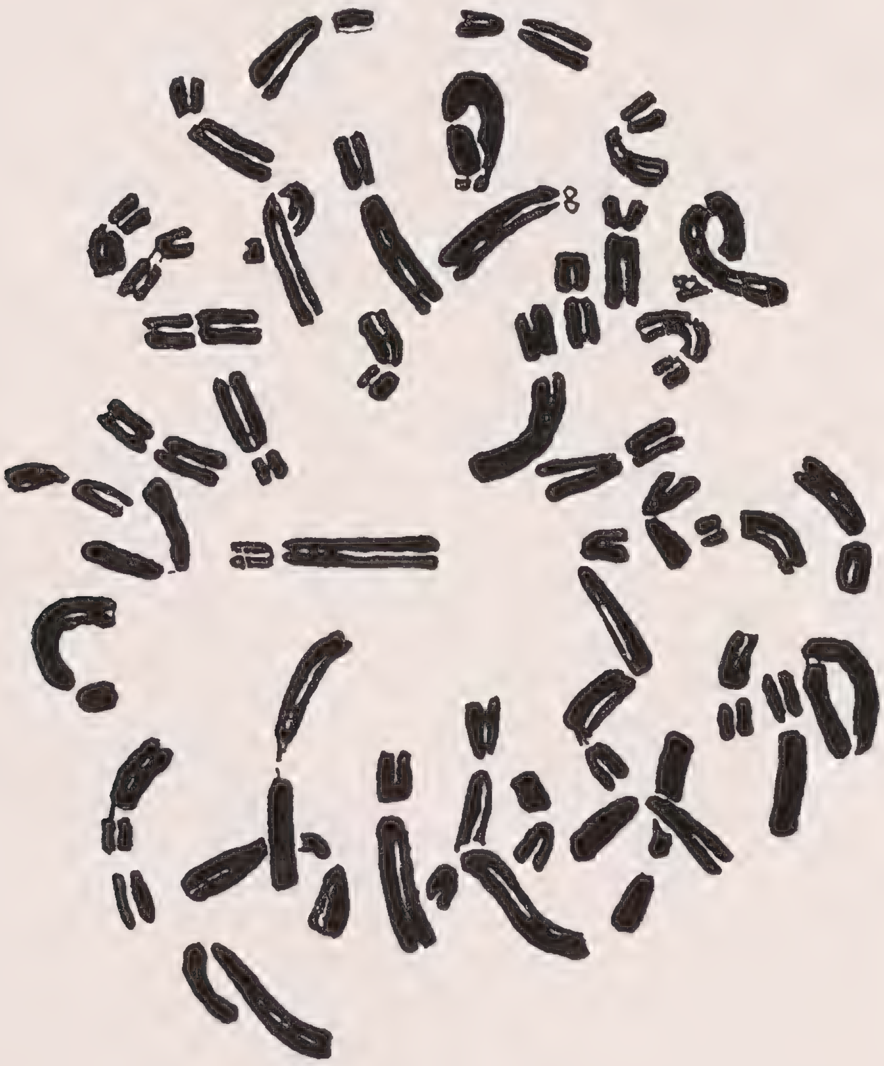

Fig. 14. Somatic chromosomes from a root-tip of *Worsleya rayneri* (J. D. Hooker) Traub and Moldenke. 2n=42. X2500.

*Worsleya rayneri* has been found to have 42 somatic chromosomes (Figure 14). These may be divided into 16 longer, 8 shorter, and 18 intermediate ones so far as length is concerned. Of the 16 longer ones, one pair has approximately median centromeres, 5 pairs are submedian, and 2 are subterminal. The 18 chromosomes of intermediate length are made up of 6 pairs with submedian centromeres and 3 pairs with subterminal ones. The 8 shorter chromosomes are apparently divided equally into groups with median or with submedian centromeres. The longest chromosomes are 6 microns, and the shortest are about two microns, in length.

A number of *Amaryllis* species, in contrast, have 22 somatic chromosomes, although polyploids with 33, 44, 66 and 77 chromosomes, respectively, are known. Our single bulb of *A. aulica* is aneuploid with 23 somatic chromosomes. The somatic chromosomes of *Amaryllis* range from approximately 4 to 10 microns in length, when preparations are fixed and prepared in the same way as were our *Worsleya* slides (root-tips pretreated with 0.2% colchicine 2 hours; fixed in 3:1 acetic alcohol over night; squashed in aceto carmine).

The monotypic *Worsleya rayneri* thus not only has a different chromosome number than found in *Amaryllis,* but in our preparations these chromosomes have been smaller, and there has been a slight difference in the proportions of observed types (a somewhat higher proportion of ones with median centromeres, and a somewhat lower proportion of those with subterminal constrictions)—when compared with known *Amaryllis* chromosome complements. The cytological picture thus tends to confirm the correctness of separating *Worsleya* from *Amaryllis.*

The 42 chromosomes of *Worsleya*—both in number and type—suggest, however, a possible derivation from a tetraploid *Amaryllis,* and a close affinity to the latter genus.

### LITERATURE CITED

Traub, H. P. Herbertia 6:118-119. 1939.

———— and H. N. Moldenke. Amaryllidaceae: Tribe Amarylleae. 22-24. 1949.

# AMARYLLID NOTES, 1963

HAMILTON P. TRAUB, *California*

### HABITAT OF AMARYLLIS x MOSTERTII

This naturalized hybrid was collected by Mr. Leon Boshoff-Mostert near Acornhoek, District of Pilgrims Rest, in Eastern Transvaal Lowveld. He writes that ''Reliable old-timers who have known these flowers all their lives, having grown up there, assure me that the plant can be found there in the wilds of those areas over a radius of some 30 or 40 miles.'' The type (nomenifer) specimen (see Plant Life *17:* 55. 1961) was prepared from a plant grown from stock propagated by Mr. Boshoff-Mostert from his Acornhoek collection.

### X **Rhodobranthus molfinoi** Traub, **hybr. nov.**

Planta hybrida sterilis, spatha infra connata, interdum prope usque ad basin fisso, floribus ''spinel''-rubris.

Hybrid between Rhodophiala spathacea (Herb.) Traub and Habranthus juncifolius Traub; spathe united below, sometimes almost cut to the base; flowers spinel pink. Holotype: Traub No. 601 (TRA) 9-11-57, and No. 600, 8-27-57, paratype.

When X *Rhodobranthus woelfleanus* Traub was described (Plant Life 14: 48. 1958; 15: 41. 1959), *Rhodophiala spathacea* (Herb.) Traub was included under *Rhodophiala bifida* (Herb.) Traub. Thus the hybrids of *Rhodophiala spathacea* with *Habranthus juncifolius* Traub

(Herbarium specimens Nos. 600 and 601 TRA) were included under *Rhodobranthus woelfleanus*. With the recognition of *Rhodophiala spathacea* (Herb.) Traub as a distinct species (see Plant Life 17: 55. 1961), these two specimens have to be considered as the basis of a distinct new hybrid, which is hereby named X *Rhodobranthus molfinoi* Traub, in honor of Dr. Jose F. Molfino, Director of Instituto de Botanica y Farmacologia, Buenos Aires, who sent the bulbs of the Argentinian plant that was later recognized as *Habranthus juncifolius* Traub.

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Subg. **Moldenkanthe** Traub, **subg. nov.**, genus Brunsvigia Heist. (Amaryllidac.)

Umbellae multiflorae; pedicelli graciles 6-9-15-30 cm. longi; ovarium 7 mm. longum 3.5 mm. diametro; tubus tepalorum rectus 7mm. longus; segmenti tepalorum 2.8—3 cm. longi, supra mediam 3—4 mm. lati; stamina usque ad 3 cm. longi; stylus usque ad 2.5 cm. longus; stigma minutum; capsula parva acute triquetra, semine singulo globoso juxtim apex placentae posito sessile.

Differs from subgenera *Coburgia* (Herb.) Traub, and *Brunsvigia*, of genus *Brunsvigia* Heist., in having a single globose seed sessile near the apex of the placenta.

Type: *Brunsvigia kirkii* Baker, Amaryll. 99. 1888. Tanganyika: Kirk, Usagura [= Uluguru?] Mts. (fide Baker, Amaryll. 99. 1888); R. M. Davies 747= 47-220 (SRGH), Mbosi (dist.), Zambi, alt. 5500 m. 11-15-32.

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Subgenus **Vallota** (Herb.) Traub, **comb. nov.**, genus Cyrtanthus (Amaryllidac.)

Syn.—Genus *Vallota* Herb., App. Bot. Reg. 29. 1821.

Type: **Cyrtanthus purpureus** (Ait.) Traub, **comb. nov.**

Note.—A new combination with "speciosus" is ruled out by the prior *C. speciosus* Dyer, Fl. Pl. S. Afr. 22: pl. 868. 1942.

Syn.—*Crinum speciosum* L. f. Suppl. 195. 1781; *Amaryllis speciosa* (L. f.) L'Hérit. Sert. Angl. 12. 1788; *Amaryllis purpurea* Ait. Hort. Kew. 1. 417. 1789; *Vallota purpurea* (Ait.) Herb. App. Bot. Reg. 29. 1821; *Vallota speciosa* (L. f.) Durand & Schinz, Consp. Fl. Afr. 5: 258. 1893 (1895).

With the description of *Cyrtanthus guthrieae* L. Bolus (in Ann. Bolus Her. 3: 76. 1921) which is allied to *Vallota speciosa* (L. f.) Durand & Schinz, the genus *Vallota* became untenable. Either the former species had to be transferred to *Vallota*, or *Vallota* had to be reduced to *Cyrtanthus*. Since species of *Cyrtanthus* cross with *Vallota speciosa* there is very close relationship, and *Vallota* has to be reduced to the earlier genus *Cyrtanthus*.

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**Cyrtanthus** x **brownii** traub, **hybr. nov.** (Amaryllidac.)

Planta hybrida inter "C. sanguineus var. flammeus" ♀ et "C. purpureus" ♂, habitu parentis polleniferi sed foliis angustioribus, umbella nonulliflora, et floribus intermediis recedit.

Hybrid between *Cyrtanthus sanguineus* var. *flammeus* ♀ and *C. purpureus* ♂. Habit resembles pollen parent, but leaves are narrower, umbel is several-flowered; flowers are intermediate. Type: Fig. 177, in La Semaine Horticole 3: 376. 1899.

Named for the renowned N. E. Brown, of the Royal Botanic Garden, Kew, who first reported this hybrid as "Cyrtanthus hybrida" (in Gard. Chron. 24: 391 (Sept. 26) 1885, and indicated that *Vallota* should be reduced to *Cyrtanthus*. Other reports include "Vallota hybrida" in La Semaine Hort. 3: 376, Fig. 177. 1899; W. Miller & F. T. Hubbard, in Bailey, Standard Cyclopedia of Hort. ed. 1930, p. 3429; and Weston, in Herbertia 4: 188, plate 67 (on page 58). 1937.

### **Pancratium centralis** (Chev.) Traub, **comb. nov.**

Syn.—*Mizonia centralis* Chev., in Rev. Bot. Appliq. 30: 626; 628, Pl. 33 & 34. 1950.

### Lectotype of **Zephyranthes insularum** Hume ex Moldk.

In 1959, Dr. H. H. Hume kindly donated a specimen ex-10725 Hume & West (now No. 622, TRA) which is one of the specimens on which he based the original description of *Zephyranthes insularum* Hume ex Moldk. Bulbs were collected from culture at Key West, Florida by H. H. Hume and E. West, and grown at Gainesville, where the specimens were taken on June 14, 1936. This specimen is now designated as the lectotype of this species in place of temporary lectotype indicated in Taxon 7(4): 111. 1958.

Lectotype of *Zephyranthes insularum* Hume ex Moldk., Hume & West No. 622 (TRA), formerly Hume & West 10725, Herbarium, Univ. of Florida, Agr. Expt. Sta. All other Hume & West 10725 specimens are designated as isolectotypes. Traub Nos. 306 and 502 are designated as paratypes.

### X **Brunserine** Traub, **hybr. gen. nov.**, (Amaryllidac.)

### X **Brunserine tubergenii** Traub, **hybr. nov.**

Plantae inter species generum Nerine et Brunsvigia hybridae, habitu intermediae.

Hybrid between species of *Nerine* and *Brunsvigia rosea* (Lam.) Hann., intermediate between the genera. Type: Fig. 1, Plant Life 14: 20, 1958.

### **Brunsvigia rosea** (Lam.) Hann. **emend.** Traub (Amaryllidac.)

Haec species solum formas tardifloras (Septembro et tardiore) prius in hoc apposite inclusas comprehendat.

### **Brunsvigia major** Traub, **sp. nov.** (Amaryllidac.)

Haec species solum formas praecocifloras (tarde Julio per Augustam) prius in "B. rosea" inclusas comprehendat.

Holotype: Traub No. 811a+b+c (TRA), 8-30-60, originally from South Africa, specimen from plants cultivated at La Jolla, Calif. Paratype: Traub No. 835a+b+c+d (TRA), 8-10-56, cult. La Jolla, Calif.

### **Hymenocallis** x **spofforthiae** (Herb.) Traub, **comb. nov.**

Syn.—*Ismene* x *spofforthiae* Herb. in Bot. Reg. 20: pl. 1665. 1834: Amaryll. 223; 224. 1837. "Sulphurea" Worsley, Herbertia 1: 56. 1934. *Hymenocallis narcissiflora* x *H. amancaes.*

*Lectotype:* plate 1665, Bot. Reg. Lond. *20:* 1834. *Specimen:* Traub. No. 860a+b+c (TRA), cult. La Jolla, Calif. 4-2-61.

Notes.—This plant is similar to the parents; the flowers are sulfur yellow. This cross has been repeated by others, particularly in Holland, and in the United States. The Dutch bulb dealers list a number of clones, including 'Sulfur Queen'.

Herbert (Amaryll. 224. 1837) crossed *Hymenocallis* x *spofforthiae* with *H. amancaes* ♂ and from this expected to obtain a more vigorous *H. amancaes.* He did not report further on this cross.

Herbert used the name "Hymenocallis x spofforthiae" (in Amaryll. 218: 410. 1837, *nomen nudum*) for a reported cross between *Hymenocallis rotata* var.

*disciformis* ♀ and *H. adnata* var. *disthica* ♂, but this never flowered, and thus was never described. Thus this is a *nomen nudum* and the name is available for a new combination.

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*Amarylloidinae* Traub, *infrafam. nov. (Amaryllidac.)* Paraperigonium adest vel nullum; stamina insolenter manifeste mutata. Typus: Genus *Amaryllis* L.

*Pancratioidinae* Traub, *infrafam. nov. (Amaryllidac.)* Paraperigonium nullum: stamina plerumque mutata aut libera et inferne incrassata vel diverse appendiculata vel inferne in cupulo staminali unita. Typus: Genus *Pancratium* L.

*Gageeae* Traub, *tribus nov. (Amaryllidac.)* Inflorescentia subumbellata vel umbellata; ovarium superius; perigonium in segmentis 6 divisum. Typus: Genus *Gagea* Salisb.

*Clivieae* Traub, *tribus nov. (Amaryllidac.)* Rhizoma subbulbosa vel bulbosa sparse tunicata; scapus solidus; tubus tepalorum brevis; segmenti tepalorum 6 divaricati; fructus baccatus. Typus: Genus *Clivia* Lindl.

*Stenomesseae* Traub, *tribus nov. (Amaryllidac.)* Folia sessilia vel petiolata; cupula staminalis plerumque adest vel stamina insolenter libera; semina dura angulares vel plana saepe alata. Typus: Genus *Stenomesson* Herb.

*Alliinae* Traub, *subtribus nov.*, tribe Allieae Kunth *(Amaryllidac.)* Perigonium regulare, tepalis 6; pedicelli ad apicem non articulati; rhizoma bulbosa tunicata. Typus: Genus *Allium* L.

*Brodiaeinae* Traub, *subtribus nov.*, tribus *Allieae* Kunth *(Amaryllidac.)* Perigonium regulare, inferne tubulosum, superne in segmentis 6 divisum; rhizoma cormosa; pedicelli ad apicem saepe articulati. Typus: Genus *Brodiaea* J. E. Smith.

*Millinae* Traub, *subtribus nov.*, tribus *Allieae* Kunth *(Amaryllidac.)* Rhizoma cormosa; perigonium regulare; ovarium ad apicem gynophorii positum. Typus: Genus *Milla* Cav.

*Platyphyllanthe* Traub, *subgenus nov.*, genus *Galanthus* L. *(Amaryllidac.)* Folia in vernationi convoluta. Typus: *Galanthus platyphyllus* Traub & Moldk.

*Hymenocallis* x *lajolla* Traub, *hybr. nov. (Amaryllidac.)* Plantae hybridae inter H. narcissiflora et H. vargasii; floribus erectis; tubo tepalorum viridi, residuum floris album; filamenta staminorum leviter incurva; cetera parentibus intermedia. Holotypus: Traub No. 929 (TRA), 7-18-62.

*Crinum* x *lajolla* Traub, *hybr. nov. (Amaryllidac.)* Plantae hybridae inter C. strictum var. traubii et C. moorei; umbella 6-flora; floribus non late patentibus; tubo tepalorum curvato; foliis tenuibus laete viridibus; cetera parentibus intermedia. Holotypus: Traub No. 938 (TRA), 8-9-62.

*Nectaroscordum tripedale* (Trautv.) Traub, *comb. nov.* Syn.—*Allium tripedale* Trautv. in Tr. S. P. B. Bot. Sada (A.H.P.)II: 485. 1873.

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## TRISTAGMA POEPP

Poeppig (1833) proposed the genus *Tristagma,* with *T. nivale* (*T. nivale* Poepp. ex Endl., 1835) as the type. This generic name has priority over *Ipheion* Raf. (1837) with a type (*I. uniflorum* (Lindl.) Raf.) which has to be transferred to *Tristagma* Poepp., on phylogenetic grounds. Baker (1871) transferred *Tristagma nivale* to the synonymy of *Milla* Cav. (1793), but such a placement is untenable on phylogenetic grounds. The species of *Tristagma* have long been recognized whereas the genus *Ipheion* Raf. has only lately (1943, 1955) been recognized to a limited extent. The name *Gardinia* Bert. (1829) has never come into use, and thus should not be considered. Thus it would be improper to conserve the latter two over the first named. The following named species of *Tristagma Poepp.* have been described:

1. *Tristagma ameghinoi* (Speg.) Speg., in Anal. Mus. Buenos Aires 7: 172. 1902.
2. *Tristagma australe* Neger ex Dusen, in Ergebn. Schwed. Ex. Magell. III. v. 207.
3. *Tristagma chubutense* Gandoger, in Bull. Soc. Bot. France 1919. lxvi. 292. 1920.
4. *Tristagma dimorphopetalum* C. Gay, Fl. Chil. 6: 126.
5. *Tristagma eremerophyllum* Speg. in Anal. Mus. Buenos Aires 7: 171.
6. *Tristagma inflatum* Rendle, in Jour. Bot. 325. 1904.
7. *Tristagma nivale* Poepp., Fragm. Syn. Pl. Chile, 9. 1833; Poepp. & Endl., Nov. Gen et Sp. ii. 28, pl. 140. 1835.
8. *Tristagma philippii* Gandoger, in Bull. Soc. Bot. France 1919. lxvi. 292. 1920.
9. *Tristagma pulchellum* Speg. in Anal. Mus. Buenos Aires. 7: 172.

The following species described under *Beauverdia, Brodiaea, Milla, Nothoscordum,* or Triteleia, have been transferred to *Tristagma* Poeppig on phylogenetic grounds:

*Tristagma violaceum* (Kunth) Traub, *comb. nov.* Syn.—*Triteleia violacea* Kunth. Enum. Pl. 4: 468. 1843.

*Tristagma bivalve* (Lindl.) Traub, *comb. nov.* Syn.—*Triteleia bivalvis* Lindl., in Bot. Reg. 15: sub pl. 1293, in adnot. 1830.

*Tristagma setaceum* (Bak.) Traub, *comb. nov.* Syn.—*Milla setaceum* Bak., in J. Linn. Soc. Bot. 11: 385. 1871.

*Tristagma lloydiiflorum* (Beauv.) Traub, *comb. nov.* Syn.—*Nothoscordum lloydiiflorum* Beauv., in Bull. Herb. Boiss. ser. 2. 8: 998, fig. 2. 1908.

*Tristagma vittatum* (Griseb.) Traub, *comb. nov.* Syn.—*Milla vittata* Griseb., in Goett. Abh. 24: 318. 1879.

*Tristagma hirtellum* (Kunth) Traub, *comb. nov.* Syn.—*Triteteia hirtella* Kunth, Enum. Pl. 4: 465. 1843.

*Tristagma felipponei* (Beauv.) Traub, *comb. nov.* Syn.—*Nothoscordum felipponei* Beauv., in Bull. Soc. Bot. Geneve, ser. 2.13: 267. 1921.

*Tristagma lorentzii* (Herter) Traub, *comb. nov.* Syn.—*Beauverdia lorentzii* Herter, in Boissiera 7: 509, fig. 54. 1943.

*Tristagma sellowianum* (Kunth) Traub, *comb. nov.* Syn.—*Triteleia sellowiana* Kunth, Enum. Pl. 4: 466. 1843.

*Tristagma poeppigianum* (C. Gay) Traub), *comb. nov.* Syn.—*Triteleia poeppigiana* C. Gay, in Fl. Chil. 6: 117. 1853.

*Tristagma porrifolium* (Poepp.) Traub, *comb. nov.* Syn.—*Triteleia porrifolia* Poepp., in Fragm. synop. Phaner. Chil. 10. 1833.

*Tristagma patagonicum* (Bak.) Traub, *comb. nov.* Syn.—*Milla patagonica* Bak., in J. Linn. Soc. Bot. 11: 383. 1871.

*Tristagma spegazzinii* (Macloskie) Traub, *comb. nov.* Syn.—*Brodiaea spegazzinii* Macloskie, in Rept. Princeton Univ. Exped. Pat. 8: 305. 1903-06.

*Tristagma tweedianum* (Griseb.) Traub, *comb. nov.* Syn.—*Milla tweediana* Griseb., in Goett. Abh. 24: 318. 1879.

*Tristagma sessile* (R. A. Phil.) Traub, *comb. nov.* Syn.—*Triteleia sessilis* R. A. Phil., Linnaea 29: 72. 1857-58.

*Tristagma viridor* (Killip) Traub, *comb. nov.* Syn.—*Brodiaea viridor* Killip, in J. Wash. Acad. Sci. 16: 566. 1926.

*Tristagma circinatum* (Sandwith) Traub, *comb. nov.* Syn.—*Brodiaea circinata* Sandwith, in Hook. Ic. Pl. 5th. ser. 4: pl. 3350. 1937.

*Tristagma uniflorum* (Lindl.) Traub, *comb. nov.* Syn.—*Triteleia uniflora* Lindl., in Bot. Reg. 15: sub pl. 1293, in nota. 1829; 23: pl. 1921. 1837.

*Tristagma gracile* (R. A. Phil.) Traub, *comb. nov.* Syn.—*Triteleia gracilis* R. A. Phil., Anal. Univ. Chil. 550. 1875.

*Tristagma brevipes* (Kunze) Traub, *comb. nov.* Syn.—*Triteleia brevipes* Kunze, in Linnaea 20: 9. 1847.

*Tristagma recurvifolium* (C. W. Wright) Traub, *comb. nov.* Syn.—*Brodiaea recurvifolia* C. W. Wright, in Bull. Misc. Inf. Kew. 117. 1915.

X **Urecocharis** Mast. ex Traub, **hybr. gen. nov.** (Amaryllidac.)

Plantae inter generum Urceolina et Eucharis hybridae, habitu intermediae. Type: X *U. clibranii* Mast. in Gard. Chron. ii. 214. fig 36. 1892; and Gartenfl. xli (1892) 501.

[**PLANT LIFE LIBRARY**, continued from page 55.]

INTRODUCTORY MYCOLOGY, ed. 2., by C. J. Alexopoulos. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1962. Pp. 613. Illus. $12.00. This second edition of an outstanding text on mycology will surely be welcomed by all students of the subject—undergraduate, graduate and interested laymen. The author has incorporated the latest findings into his discussions on morphology, systematics, physiology and genetics. Thus it is particularly refreshing to note that he has had the courage to recast the classification of the fungi along new lines in harmony with recent research. The material is presented in four parts: (a) organisms of uncertain origin; (b) the lower fungi; (c) the higher fungi, and (d) lichens. It is to be regretted that Dr. Alexopoulos had to omit the Schizophyta due to space limitations imposed by rising publication costs. This well-written, stimulating text is recommended without reservations to all interested in mycology.—*H. P. Traub.*

QUANTITATIVE CHEMICAL TECHNIQUES OF HISTO- AND CYTOCHEMISTRY, by D. Glick. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1962. Pp. 470. Illus. $14.50. This first of two volumes on small volume work in quantitative histo- and cytochemistry was written for the purpose of "gathering into a more easily available and usable form the widely scattered techniques and methods" in the fields indicated. The sections of the book are (1) preparation of biological sample; (2) measurement of sample; (3) general apparatus and manipulation; (4) gasometric techniques; (5) electrometric techniques; (6) dilatometric techniques; and (7) fluorometric techniques. There is a bibliography, list of manufacturers, buffer tables, and index. This outstanding book is highly recommended to all workers in this field.

CUCURBITS, by T. W. Whitaker and G. N. Davis. John Wiley & Sons (Interscience Div.), 440 Park Av. So., New York 16, N. Y. 1962. Pp. 250. Illus. $11.50. This critical survey of all aspects of knowledge concerning the cultivated cucurbits by two outstanding authorities satisfies a long felt need. After considering the geographic origin of the important cultivated cucurbits—watermelon, cucumber, gherkin, muskmelon, dish-rag gourd, pumpkins, gourds, and chayote, chapters are devoted to (1) general morphology and anatomy, (2) taxonomy of cultivars, (3) cytogenetics and plant breeding, (4) effect of environmental factors on growth and development, (5) culture, (6) seed production, (7) diseases and insect pests, (8) harvesting, transportation, storage and marketing, and (9) composition and uses. There is a bibliography, table of conversion factors, subject and author index. The text is adequately illustrated, including one color plate. This attractive book is recommended to all interested in cucurbits.

THE MICROBIOLOGY OF THE ATMOSPHERE, by P. H. Gregory. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1961. Pp. 251. Illus. $10.50. This first comprehensive book by an outstanding authority in this new field of research—spore dispersal and the mechanism by which this is achieved—will be of interest to those entrusted with the control of epidemic diseases, and to all interested in the distribution of bacterial, fungal and plant life. This book should contribute toward answering such questions as to how spores become air borne, how they are transported, and how and where they are deposited. There is an extensive bibliography, a subject index and an author index. The illustrations are outstanding, including color plates for visual identification. Highly recommended.

[**PLANT LIFE LIBRARY**, continued on page 68.]

# REGISTRATION OF NEW AMARYLLID CLONES

*Mr. W. D. Morton, Jr., Registrar,*
*Mr. Edward Authement, and Mrs. Emma D. Menninger,*
*Assistant Registrars*

This department has been included since 1934 to provide a place for the registration of names of cultivated *Amaryllis* and other amaryllids on an International basis. The procedure is in harmony with the INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE (edition publ. 1961) and the INTERNATIONAL CODE OF NOMENCLATURE FOR CULTIVATED PLANTS (edition publ. 1958). Catalogs of registered names, as well as unregistered validly published names, will be published from time to time as the need arises. The first one, ''DESCRIPTIVE CATALOG OF HEMOROCALLIS CLONES, 1893-1948'' by Norton, Stuntz and Ballard was published in 1949. This may be obtained at $2.50 prepaid from: Dr. Thos. W. Whitaker, Executive Secy., THE AMERICAN PLANT LIFE SOCIETY, Box 150, La Jolla, Calif. CATALOG OF HYBRID NERINE CLONES, 1882-1958, by Emma D. Menninger; and CATALOG OF BRUNSVIGIA CULTIVARIS, 1837-1959, by Hamilton P. Traub and L. S. Hannibal, were published in 1960 Plant Life, with additions to both in Plant Life 1961. In Plant Life 1961, the first edition of THE GENUS X CRINODONNA was published which serves also as a catalog of cultivars. A catalog of Amaryllis names and also catalogs of the names of other cultivated amaryllids, are scheduled for publication in future issues.

Only registered named clones of Amaryllis and other amaryllids are eligible for awards and honors of the AMERICAN AMARYLLIS SOCIETY at Official Amaryllis Shows.

Correspondence regarding registration of all amaryllids such as *Amaryllis, Lycoris, Brunsvigia, Clivia, Crinum, Hymenocallis,* and so on, should be addressed to Mr. W. D. Morton, Jr., Registrar, 3114 State Street Drive, New Orleans 25, Louisiana. The registration fee is $2.00 for each clone to be registered. Make checks payable to AMERICAN PLANT LIFE SOCIETY.

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Registration of Nerine cultivars.—Under date of Oct. 15, 1962, Dr. H. R. Fletcher, Secretary, International Commission for Horticultural Nomenclature and Registration, writes, ''I am happy to be able to inform you that at the XVIth International Horticultural Congress, held in Brussels in August-September, 1962, the Council of the International Society for Horticultural Science agreed to the American Plant Life Society acting as International Registration Authority for Cultivars of Nerine.''

# AMARYLLIS BREEDERS, 1952 TO PRESENT TIME

Edward F. Authement, *Assistant Registrar*

The following list of recent Amaryllis breeders (who have named and registered Amaryllis clones since 1952) was compiled from Plant Life, 1952 to the present time. There are other Amaryllis breeders who have not yet named and registered Amaryllis clones. They, and others who later enter this field, will be added in the coming years in the Amaryllis Year Book.

The abbreviations were adopted after consultation with Messrs. W. D. Morton, Jr., Robert G. Goedert, and Dr. Hamilton P. Traub.

Abbreviation — Amaryllis Breeder

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Beck—Mr. Ralph H. Becker, 1823 Treasure St., New Orleans, La.
BM—Mr. Leon Boshoff-Mostert, Kleinskuur, Balfour, Transvaal, So. Afr.
Both—Mr. E. Both, Adelaide, Australia
Cal.—Mr. Tim Calamari, 1623 Pauger Dr., New Orleans, La.
Clem.—Mrs. Margie Clements, 703 Ridgewood Dr., Metairie, La.
Cron.—Mrs. John F. Cronin, P. O. Box 207, Lutz, Fla.
Dorr.—Mrs. H. E. Dorr, 33 Oaklawn Dr., Metairie, La.
Dug.—Mr. R. E. Duggan, 6864 Milne St., New Orleans, La.
HDL-G.—Harry de Leeuw Co. Ltd., South Africa. Wholesalers only. Clones registered exclusively, and sold in U. S. A., by Mr. Robert D. Goedert, Jacksonville, Fla.
Eub.—Mr. R. W. Eubank, 1301 York St., Corpus Christi, Tex.
Fitch.—Mr. Charles Marden Fitch, 1120 Cove Rd., Mamaroneck, New York.
Font.—Mr. Henry P. Fontcuberta, 2717 Cleveland Av., New Orleans, La.
Gasp.—Mr. S. P. Gasperecz, 1219 Short St., New Orleans, La.
Har.—Mrs. H. L. Harris, 3645 S. Saxet Dr., Corpus Christi, Tex.
Henry—Mrs. Mary G. Henry, Gladwyne, Penna.
Kl.—Mrs. John Klein, Jr., 2504 Mistletoe St., New Orleans, La.
Lud.—Ludwig & Co., P. O. Box 18, Hillegom, Holland.
Mitch.—Mrs. Donald Mitchell, 1443 Arabella St., New Orleans, La.
Mull.—Mr. Tobby Mullen, 1814 Independence St., New Orleans, La.
Park.—Mrs. Isabelle Parker, 424 Crawford, Biloxi, Miss.
Perr.—Mr. W. J. Perrin, 4753 Press Dr., New Orleans, La.
Pick.—Mrs. A. C. Pickard, 1702 N. Blvd., Houston 6, Tex.
Raa.—Mr. R. E. Raasch, 345 Deddridge St., Corpus Christi, Tex.
Ram.—Mr. Charles Ramelli, 126 Jeff Davis Ave., Biloxi, Miss.
Schm.—Mr. Frederick B. Schmitz, Rt. 1, Box 438, Port Sulphur, La.
Sol.—Mr. Robert L. Solomon, 3806 42nd St., Tampa, Fla.
St.-J.—Mrs. Harry St. John, 2614 Holly Grove, New Orleans, La.
Terry—Mr. J. W. Terry, 1107 Mamie St., Hattiesburg, Miss.
Traub—Dr. Hamilton P. Traub, 5804 Camino de la Costa, La Jolla, Calif.
VM—Messrs. G. C. van Meeuwen & Sons, Heemstede, Holland
VW—M. van Waveren & Sons, Hillegom, Holland
CW—C. Warmenhoven, Holland. Wholesaler only. Business was started in 1962 by Cornelius Warmenhoven II. Clones registered by Robert D. Goedert, Jacksonville, Fla.
WSW—W. S. Warmenhoven, "Zonnewende", Holland. Wholesaler only. U. S. Agent, P. J. Komen, Anna Paulowna, Holland. Business started in 1923 by Willem S. Warmenhoven, the eldest son of Cornelius Warmenhoven I. Sells bulbs under brand name "Royal Dutch". Clones registered by Claude W. Davis, Baton Rouge, La.
WWZ—W. Warmenhoven & Zonen, Holland. (1860-1962). Founded by Willem Warmenhoven in 1860, who was succeeded by his son, Cornelius I, who died in 1936. His two younger sons, Simon and Cornelius II, jointly carried on the business until 1962.

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## HYBRID AMARYLLIS CLONES

**Registered by Ludwig & Co., Hillegom, Holland:**

**Amaryllis clone 'Home Decorator'**; reg. A-702-D5A, 7-3-62; 26″-28″ high; umbel 4-fld; fls 8″-9″ wide; poppy red (16/1), suffused salmon, slightly darker throat.

**Amaryllis** clone **'Dutch Doll'**; reg. A-703-D5A, 7-3-62; 22″-24″ high; umbel 4 or more-fld; fls. 7″-9″ wide; picotee type—dainty red edge on each pure white seg.

**Amaryllis** clone **'Square Dance'**; reg. A-704-D5A, 7-3-62; 26″-28″ high; umbel 4-fld; fls. 9″-10″ wide; picotee type—broad red edge on each white, slightly wavy seg; throat apple-green.

**Amaryllis** clone **'Streaking Stripes'**; reg. A-705-D5A; 7-3-62; 26″-28″ high; umbel 4-fld; fls. 8″-9″ wide; pure white with mandarin red stripes on each seg; throat apple green; 3 inner segs slightly bearded.

**Amaryllis** clone **'Trixie'**; reg. A-706-D5A, 7-3-62; 22″-24″ high; umbel 4-fld; fls. 8″-9″ wide; cherry red (722/2), changing to tyrian rose (24/1); throat slightly deeper; orange dusted in full sun.

**Amaryllis** clone **'Winter Carnival'**; reg. A-707-D5A; 7-3-62; 25″-27″ high; umbel 4-fld; fls. 9″-10″ wide; pure white at first with deep green throat, segs changing to a suggestion of light yellow when the throat changes to whitish.

**Registered by W. S. Warmenhoven, (by P. J. Komen), Anna Paulowna, Holland:**

**Amaryllis** clone **'Marion'**; reg. A-682-D4A; 7-8-62; 22″-23″ high; umbel 4-fld; spr.; fls. 8″-8½″ wide; white, shading to light creamy yellow on edges of segs; three upper segs marked with claret rose (021).

**Amaryllis** clone **'Blushing Beauty'** (formerly Rose Queen); reg. A-683-D5A, 7-8-62; 22″ high; umbel 3—4-fld; fls. 8″ wide; azalea pink (618), with underlay of white.

**Amaryllis** clone **'Elvira Aramayo'**; reg. A-684-D5A, 7-8-62; 20″ high; umbel 4-fld.; fls. 7″ wide; carmine red (21), overlaid with magenta rose (027), giving reddish purple effect.

**Amaryllis** clone **'Oasis'** (formerly Snow Queen); reg. A-685-D5B, 7-8-62; 21″ high; umbel 3—4-fld.; spr.; fls. 7½″ wide; pure white with greenish throat.

**Amaryllis** clone **'Golden Triumphator'**; reg. A-686-D5A; 7-8-62; 24″ high; umbel 3—4-fld; spr.; fls. 9½″ wide; mars orange (016), slightly blending to light golden orange, throat brick red (016).

**Amaryllis** clone **'Maryland'**; reg. A-687-D5A; 7-8-62; 20″ high; umbel 3—4-fld; spr.; fls. 8″ wide; begonia (619) shading to scarlet bands on each side of upper segs; lower segs begonia with white mid-stripe.

**Amaryllis** clone **'Catherine Valente'**; reg. A-688-D5B, 7-8-62; 23″ high; umbel 3—4-fld; spr.; fls. 7″ wide; frosted delft rose (020/1) with markings of geranium lake (20) toward the throat in upper segs.

**Amaryllis** clone **'Orange Favorite'**; reg. A-689-D5A, 7-8-62; 15″ high; umbel 3—4-fld; spr.; fls. 6½″ wide; polychrome, Indian orange (713) with glowing red throat.

**Amaryllis** clone **'Orange Wonder'**; reg. A690-D5A, 7-8-62; 20″ high; umbel 3—4fld; spr.; fls. 7″ wide; Indian orange (713) blending to glowing capsicum (715).

**Amaryllis** clone **'Television'**; reg. A-691-D5A, 7-8-62; 17″-20″ high; umbel 4—5-fld; spr.; fls. 6½″ wide; French rose (520) blended with white to give a frosted effect; upper segs marked with porcelain rose (620) on each side of midstripe.

**Amaryllis** clone **'Rotterdam'**; reg. A-692-D5A, 7-8-62; 20″ high; umbel 4-fld; spr.; fls. 7″-8″ wide; currant red (822/2), deepening to (821) in throat; round form, slightly bearded in throat.

**Amaryllis** clone **'Brilliant Star'**; reg. A-708-D5A, 7-8-62; 20″ high; umbel 4-fld; spr.; fls. 6″ wide; currant red (821) self, deepening in the throat.

**Amaryllis** clone **'Dutch Master'**; reg. A-709-D5A; 22″ high; umbel 3—4-fld; spr.; fls. 7½″ wide, blending of rose Bengal with white base, midrib and edges white.

**Amaryllis** clone **'Extase'**; reg. A-710-D5A, 7-8-62; 36″ high; umbel 3—4-fld; fls. 9″ wide; orange red with fine white margins on each seg.

**Amaryllis** clone **'Florien'**; reg. A-711-D5A, 7-8-62; 24″ high; umbel 4-fld.; spr.; fls. 8″ wide, a blend of white and rose madder (23), white band in center of segs.

**Amaryllis** clone **'Floriade'**; reg. A-712-D5A, 7-8-62; 24″ high; umbel 4-fld., fls. 9″ wide, a soft blend of white and rose pink (427).

**Amaryllis** clone **'Little Diamond'**; reg. A-714-D5A; 7-8-62; 18″ high; umbel 4-fld.; spr.; fls. 8″ wide; dawn pink (523) with white midrib in each seg; round, flat flower.

**Amaryllis** clone **'Mount Everest'**; reg. A-715-D5A; 7-8-62; 22″ high; umbel 3—4-fld.; spr.; fls. 8½″ wide; orient pink (416) and China rose (024).

**Amaryllis** clone **'Pink Beauty'**; reg. A-719-D5A, 7-8-62; 20″ high; umbel 3—4-fld.; fls. 7″ wide, rose pink (427) blending with white on upper 3 segs; lower segs white with tinge of orient pink (416/3).

**Registered by Robt. D. Goedert, Jacksonville, Fla., for W. Warmenhoven & Zonen:**

**Amaryllis** clone **'Irene'**; reg. A-713-D5A, 7-8-62; 18″ high; umbel 4-fld.; fls. 8″ wide; Salmon pink (619) with lighter seg margins; round flower.

**Amaryllis** clone **'Orange Nassau'**; reg. A-716-D5A; 18″ high; umbel 3—4-fld.; spr.; fls. 7″ wide, burnt orange (01), gold dusted in strong light; a beautiful combination.

**Amaryllis** clone **'Madame Curie'**; reg. A-717-D5A, 7-8-62; 14″ high; umbel 3—4-fld.; spr.; fls. 6″ wide, shrimp pink (616), self, deeper veins, and throat.

**Amaryllis** clone **'Mount Blanc'**; reg. A-718-D5A, 7-8-62; 18″ high; umbel 3—4-fld; spr.; fls. 6″ wide; pure white, segs ruffled; greenish throat.

**Registered by Frederick B. Schmitz, Port Sulphur, Louisiana:**

**Amaryllis** clone **'Flame'**; reg. A-693-D7; 4-10-62; 20″-21″ high; umbel 4-fld.; fls. 6″ wide, vermilion (18) self.

**Amaryllis** clone **'Neel'**; reg. A-694-D5A, 4-10-62; 18″-20″ high; umbel 4-fld.; spr.; fls. 7″ wide; orient red (819) delf, with greenish throat.

**Amaryllis** clone **'Kaye'**; reg A-695-D5A, 4-10-62; 21″-22″ high; umbel 3fld.; spr.; fls. 6½″ wide, jasper red (018) with faint white streak in center of segs; light greenish throat.

**Amaryllis** clone **'Grace'**; reg. A-696-D5A, 4-10-62; 18″-19″ high; umbel 3-fld.; spr.; fls. 6″ wide, white edged with orient red (819/1).

**Amaryllis** clone **'Miss Annie'**; reg. A-697-D4A, 4-10-62; 18″ high; umbel 4-fld; spr.; fls. 6″ wide; currant red (821).

**Registered by W. J. Perrin, 4753 Press Dr., New Orleans, Louisiana:**

**Amaryllis** clone **'Grand Bay'**; reg. A-698-D5A, 5-6-62; 15″-18″ high; umbel 4-fld.; spr.; fls. 6″ wide; geranium lake (20/1), white midrib, all segs minutely dotted reddish.

**Registered by Mrs. H. E. Dorr, 33 Oaklawn Dr., Metairie, Louisiana:**

**Amaryllis** clone **'Scotty's White'**; reg. A-699-D5A, 5-6-62; 16″-18″ high; umbel 4-fld.; spr.; fls. 6″ wide; white with greenish tint; back of segs with green midrib.

**Amaryllis** clone **'Otto Felix'**; reg. A-700-D5B, 5-6-62; 23″ high; umbel 4-fld.; spr.; fls. 6½″ wide; very fragrant, greenish to white throat, with Delft rose outer half of segs.

**Amaryllis** clone **'Gemato'**; reg. A-701-D5B, 5-6-62; 15″ high; umbel 4-fld.; spr.; fls. 5½″ wide, lively blood red (820) almost to throat, white rim around all segs; very fragrant.

**Registered by G. C. Van Meeuwen & Sons, Heemstede, Holland:**

**Amaryllis** clone **'Hong Kong'**; reg. A-720-D5A, 7-8-62; 22″ high; umbel 4-fld., fls. 8″ wide, blood red (820) with currant red (821) throat; flower round, throat slightly bearded.

**Amaryllis** clone **'Mars'**; reg. A-721-D5A; 7-8-62; 28″ high; umbel 4—5-fld.; spr.; fls. 8″ wide, currant red (821), very dark throat.

**Amaryllis** clone **'Osiris'**; reg. A-722-D5A, 7-8-62; 24″ high; umbel 4-fld.; spr.; fls. 8½″ wide, orient red (819) with a blood red (820) throat.

**Amaryllis** clone **'Rilona'**; reg. A-723-D5A, 7-8-62; 24″ high; umbel 4-fld.; spr.; fls. 9″ wide, light salmon (412), slightly darker throat.

**Amaryllis** clone **'Rose Marie'**; reg. A-724-D5A, 7-8-62; 24″ high, umbel 4—5-fld.; spr.; fls. 8″ wide; dominating color is carmine rose (621), light mid-rib; lower segs whitish, blending with greenish throat.

**Registered by Robt. D. Goedert, Jacksonville, Fla. for Harry de Leeuw Co. So. Afr.:**

**Amaryllis** clone **'Orangedale'**; reg. A-728-D5A, 7-8-62; 19″ high; umbel 4-fld.; spr.; fls. 6½″ wide; capsicum red (715), slightly deeper throat.

**Amaryllis** clone **'Rosaline'**; reg. A-729-D5A, 7-8-62; 19½″ high; umbel 2-fld.; spr.; fls. 7½″ wide; mottled magenta rose.

**Amaryllis** clone **'Ruby Glow'**; reg. A-730-D5A, 7-8-62; 19″ high; umbel 4-fld.; spr.; fls. 6″ wide, geranium lake (20), slightly darker in throat.

**Amaryllis** clone **'Tangerine'**; reg. A-731-D5A, 7-8-62; 8½″; umbel 4-fld.; spr.; fls. 5″ wide, Delft rose (020), very clear and striking in appearance.

**Amaryllis** clone **'Terra Cotta'**; reg. A-732-D5A, 7-8-62; 8″ high; umbel 4-fld.; spr.; fls. 6″ wide, vermilion (18), blending into rich claret rose (21) in throat.

**Registered by Robt. D. Goedert, Jacksonville, Fla., for C. Warmenhoven:**

Applications received too late for inclusion of descriptions which will appear in the "Catalog of Hybrid Amaryllis Clones" in the 1964 Year Book. **Amaryllis** clone **'Apollo'** (CW, 1962), reg. A-725, orange red; **'Flamboyant'** (CW, 1962), reg. A-726, scarlet red; and **'Topscore'** (CW, 1962), reg. A-727.

**Registered by M. Van Waveren, Hillegom, Holland:**

Applications received too late for inclusion of descriptions which will appear in the "Catalog of Hybrid Amaryllis Clones" in the 1964 Year Book: **'Danny Kaye'** (VW, 1962), reg. A-733, scarlet red; **'David Hollestelle'** (VW, 1962), reg. A-734; orange scarlet; **'Independence'** (VW, 1962), reg. A-725, orange, **'Madam Van Waveren'** (VW, 1962), reg. A-736, striped white; **'Pola Negri'** (VW, 1962), reg. A-737, very dark red; **'Polar Light'** (VW, 1962), reg. A-738, dazzling white; **'Scarlet Globe'** (VW, 1962), reg. A-739, scarlet; and **'Telstar'** (VW, 1962), reg. A-740, rose.

**Registered by G. C. Van Meeuwen & Sons, Heemstede, Holland:**

Applications received too late for inclusion of descriptions which will appear in the "Catalog of Hybrid Amaryllis Clones" in the 1964 Year Book: **'Albaron'** (VM, 1962), reg. A-741; **'Amor'** (VM, 1962), reg. A-742; **'Aphrodite'** (VM, 1962), reg. A-743; **'Minerva'** (VM, 1962), reg. A-744; **'Pallas'** (VM, 1962), reg. A-745; and **'Thalia'** (VM, 1962), reg. A-746.

### HYBRID NERINE CLONES

The following additions (not registered) to the "Catalog of Nerine Cultivars" have been sent in by Emma D. Menninger, Greenoaks, 730 North Old Ranch Road, Arcadia, Calif. (See PLANT LIFE 18: 43. 1962, for additions up to 1962.)

| Name | Grower/supplier | Description, etc. |
|---|---|---|
| **'Ancilla'** | Va/Va | Carmine red (HCC-623) lowest seg lighter. |
| **'Bettina'** | Va/Va | Neyron rose (HCC-623), darker nerved. |
| **'Nereus'** | deG/deG | Outside, fuchsine pink (HCC-627/2), inside (627/3). |
| **'Rosy Queen'** | deG/deG | Neyron rose (623) to center, lighter striped. |
| **'Pontos'** | deG/deG | Mutation from 'Rosy Queen', dark Neyron rose (623), lighter center, segs ruffled. |
| **'Record'** | vV/vV* | Clone of **Nerine bowdenii**; phlox pink (625/1). |
| **'Fenwick'** | ? | A clone of **Nerine bowdenii**; see Gard. Chron. Dec. 8, 1962, p. 405. |

* Additional abbreviation: vV—G. J. van Velsen, Haemskerk, Holland.

[**PLANT LIFE LIBRARY**, continued from page 62.]

MUSHROOMS AND TRUFFLES, by Rolf Singer. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1962. Pp. 272. Illus. $10.25. This book by an outstanding authority provides a reliable, readable text on the cultivated mushrooms and truffles. This is particularly important since these are now being grown on the basis of new scientific principles, and the methods of control are being improved. After a stimulating preface, the author provides a brief general introduction to the botany of mushrooms, and chapters on the botany and culture of the important kinds, including a potentially wider range of species; weeds and weed fungi; diseases and pests; mushrooms as food, and other uses. This important text is highly recommended to all interested in this subject.

NEW METHODS OF CELL PHYSIOLOGY, by O. H. Warburg et al. John Wiley & Sons (Interscience Div.), 440 Park Av. So., New York 16, N. Y. Pp. 644. Illus. $35.00. This outstanding volume contains 95 papers on new methods of cell physiology as applied to research in cancer, photosynthesis, and mechanism of x-ray action in the laboratory of Dr. Warburg from 1945 to 1961. There is a brief biography of Dr. Warburg, with portrait, by Dean Burk. This is followed by papers concerned with the medical problem of the origin of cancer cells, and the general biological problem of the conversion of light energy into chemical energy in green cells. The purpose of the publication of the methods at this time is to hasten the use of the new methods in cell physiology so as to enlist the collaboration of researchers generally in the solution of the problems already indicated. This book represents a landmark, and is recommended without reservations to all who are interested in these fields of research.

INTRODUCTION TO IMMUNOCHEMICAL SPECIFICITY, by W. C. Boyd. John Wiley & Sons, 440 Park Av. So., New York 16, N. Y. 1962. Pp. 158. Illus. $8.00. This book was written to serve as an introduction to immunochemical specificity for the non-specialist, and specialist. It incorporates earlier work which has served as a foundation for recent advances. The chapters are devoted to antibodies I and II, antigens, blood groups, plant agglutinins (lectins) I and II, blood group antigens, salmonella antigens, union of antibody with antigens, and energy of antibody-antigen reactions. This stimulating text is highly recommended to the specialist and also the non-specialist.

[**PLANT LIFE LIBRARY**, continued on page 146.]

# 3. GENETICS AND BREEDING

## LYCORIS HYBRIDS PROVE REWARDING

SAM CALDWELL, *Tennessee*

My first attempts to cross-breed some of the several *Lycoris* species in my plantings began in 1953. A few apparently sound seeds were gathered and planted. Then in 1954 and 1955 there were opportunities to cross pollinate the *L. sprengeri* and fertile strain *L. radiata* flowers that were appearing at the same time in late summer. The crosses seemed to ''take'' readily both ways, and more than 100 seedling bulbs eventually resulted.

In succeeding years I tried other crosses, some failing and some producing a few to many seeds. These efforts toward *Lycoris* hybridizing were reported in the 1958 HERBERTIA and at greater length in *Bulletin No. 5* (March 1960) of the *Louisiana Society for Horticultural Research.* It was frustrating, however, to be writing about *Lycoris* hybrids when I was not at all sure that I had any. Years passed and there were no flowers to prove that actual crosses of different species had been achieved.

Thus it was a thrill in August of 1961 to find a bud pushing up in my lycoris ''nursery'' bed in a row labeled *''L. sprengeri* x *L. radiata,* 1955.'' The flowers on the scape reached peak development on August 17. Happily, two others came along into bloom later in the month—one more in the 1955 lot of seedlings and one from the same cross made in 1954.

These results were definitely worth waiting for. Not only are they beautiful flowers; they are utterly different from anything presently available in lycoris. It was a joy to find so much variation in the three scapes that appeared, from the rich dark purple-red, rather narrow segments of flowers on ''Sprenrad 1'' to the broader segments and lighter purplish pink coloring in ''Sprenrad 3.'' ''Sprenrad 2,'' is practically identical in form with No. 3 but has coloring nearly as dark as No. 1. There are still some 30-odd bulbs of this cross to bloom and well over 50 of the reverse (*L. radiata* x *L. sprengeri*) cross; so the coming years should provide plenty of excitement.

It will take years of testing to determine the adaptability to garden cultivation of these hybrids. The seed parent, *L. sprengeri,* is quite hardy outdoors in New York state, producing its foliage in spring after the coldest of winter weather is past. Unfortunately, all the ''Sprenrad'' hybrids seem to have inherited the fall-foliage habit from *L. radiata.* Probably they will be safe wherever that species can be grown, but they may not thrive farther north, because their fall and winter leaves will be subject to cold damage. Their leaves, incidentally, are easily distinguished from *L. radiata* foliage by a more bluish green color and less prominent mid-rib veins.

The ''Sprenrad'' name and numbers for the seedlings are being used for convenience at present. In time some of them will likely get clonal designations.

The appearance of these flowers furnished inspiration for a renewal of my hybridizing efforts. I should like to urge other amaryllid enthusiasts to join in this rewarding activity. It seems incredible that here we have a genus of fine garden flowers in which almost no breeding has been done. True, it is slow work but probably no slower than daffodil breeding, especially for gardeners who live in the Lower South, where most lycoris grow faster than they do in colder climates. By getting my seedlings out of their starting pots and into ground growing beds faster, I hope to speed up flowering of my own hybrids.

From my own experience I would judge that all of the lycoris which normally set seed to their own pollen will cross with other fertile types. And this is not the end; all three of my new ''Sprenrad'' blooms set good seed when self pollinated and also crossed back on both their parents and on *L. haywardii.* Failures come when I try to work with *L. squamigera, L. incarnata, L. caldwellii, L. houdyshelii, L. elsiae* and the common form of *L. radiata,* none of which have ever set seed in my garden. Using pollen from these seemingly sterile lycoris on fertile species I have gotten occasional questionable ''takes'' resulting in just one or two seeds. I fear that these may be due to parthenogenesis or to accidental selfing of the flowers but of course am growing the seedlings along in the hope that they are hybrids.

Following is a complete list of apparently successful crosses I have made, including those of the 1961 season:

**L. haywardii** X **L. sanguinea** and the reverse
**L. haywardii** X L. "sperryi" and the reverse
**L. haywardii** X L. "Sprenrad"
**L. radiata** X **L. haywardii**
**L. radiata** X L. "Sprenrad"
**L. radiata** X **L. traubii**
**L. radiata** X **L. sprengeri** and the reverse
**L. radiata** X L. "sperryi"
**L. sanguinea** X L. "sperryi" and the reverse
**L. sprengeri** X **L. haywardii**
**L. sprengeri** X **L.** "sperryi"
**L. sprengeri** X **L.** "Sprenrad"

The *L.* ''sperryi'' mentioned is an unidentified but very fine hardy golden flowered lycoris collected in hills near Huchow, China in 1925 and brought to Nashville, Tennessee by the mother of a Methodist missionary then serving in Huchow.

Some of the crosses listed were made possible by the cooperation of Mr. B. Y. Morrison, Pass Christian, Mississippi, whose lycoris bloom several weeks earlier than mine. Through the flowering season he air-mailed fresh pollen of various species for use on my flowering scapes as opportunity offered.

For those interested in *Lycoris* hybridizing, the very simple methods used for making crosses and growing seedlings are covered in the two published reports mentioned at the beginning of this article. Certainly all the crosses I have made should be repeated many times and other combinations should be tried. By saving pollen of some of the earlier flowering species, growers in the Lower South may be able to crossbreed the St. Augustine type *L. aurea,* and the hardier *L. traubii* should make an even better seed parent.

# LYCORIS NOTES, 1962

T. H. JACOWAY

For several years I have been of the opinion that the genus Lycoris held considerable promise in the cut flower market. Ever since a friend in Hastings, Florida gave me 18 *L. aurea* bulbs in 1956, the flowers have had a special appeal. Here in Palatka they have been virtually unknown. This is only 28 miles from St. Augustine, long the ''home'' of this beautiful amaryllid—at least in Florida. Mrs. MacArthur reported, in Volume I of Herbertia, that the Oldest City has more of these bulbs than any other section of the state. This is no doubt a true statement even at the present time. In September and October the lovely golden flowers are a compelling sight all over St. Augustine. Mr. John R. Heist, who sold *L. aurea* bulbs by the hundreds many years ago, has probably the largest individual planting in that city, numbering about 1500 bulbs. He is no longer in the commercial field and is growing them strictly for enjoyment.

In the summer of 1959 I purchased 400 bulbs from a California dealer, who imported them from Japan, and advertised them as *L. aurea.* They have done well and bloomed each year since. The flowers are all yellow, but look vaguely ''different''. They bloom several weeks earlier than the local species. The foliage is distinctly not *L. aurea* and there seem to be at least three species or varieties, if foliage appearance alone is considered. The literature states that recent importations from Japan is the species *L. traubii.* Some of mine may indeed be *L. traubii,* but possibly there are other species also. I was able to get several dozen seed from this planting in 1959 by selfing, and these seedlings are vigorous at the present time, but still rather small.

Following up the cut flower idea, I entered into partnership with Junius Bolin, of Welaka, Florida. We started buying *L. aurea* bulbs around St. Augustine and Hastings in the early summer of 1960 and were successful in securing about 300. They flowered that fall and we gave away our entire production of flowers to churches and friends in order to stimulate interest locally.

In the early summer of 1961, I started purchasing again in the same locale. Most homeowners, I discovered, would willingly part with at least some of their stock. In this manner we accumulated another 2,000 or more bulbs.

In the process of making these door-to-door purchases, it occurred to me that it might be of interest to find out something about the soil conditions under which they were growing in each instance. The idea being that we could then grow them better in the new location if we knew what they liked and were accustomed to. Accordingly, I took soil samples in most locations. Being employed as a fertilizer salesman, I had access to our company-operated, modern, and well staffed laboratory for analysis. The results were more or less uniform, showing a pH range of 6.3 to 7.7. The calcium (expressed in pounds per acre—six inches deep) ran from 1385 to 2000. These were all in St. Augustine.

The lone Hastings location showed a pH value of 5.5 and a calcium reading of 670. Around St. Augustine it is common to find considerable shell mixed with the soil, while in Hastings there is none. There was no distinct difference in the size and general appearance of the bulbs in any instance.

In both years our purchases were made as soon as the foliage had yellowed and died, usually in May and June. We replanted in our Welaka location after liming to bring the pH up to about 6.5. We were surprised to discover that the bulbs were able to form new roots, up to three inches long, after being replanted for as short a time as two weeks.

With the view in mind that there might also be a demand for the red species, *L. radiata,* we bought 1000 bulbs from W. J. Leseman near Green Cove Springs, Florida. As reported by Wyndham Hayward in the 1959 issue of Herbertia, Mr. Leseman has this species growing by the thousands. Our volume of this flower was so small in 1961 as to make it not worthwhile commercially.

In September of 1961 we made our first commercial shipment of *L. aurea* flowers to a New York wholesale florist. To this day we don't know what happened to them, although we know that they were received. That dampened our spirits somewhat, in regard to long distance shipping, and we started selling the cut flowers to local retail florists. They were very well received, and the demand exceeded our small supply.

Plans are for continued effort in the cut flower field with Lycoris species. This will be primarily *L. aurea, L. traubii,* and *L. radiata.* Other species which may offer possibilities, but which we have in very limited supply, are *L. sanguinea, L. sprengeri, L. caldwellii,* and a cream which was bought as *L. albiflora.* This entire genus, in our opinion, is an extremely interesting one and deserving of wider attention.

# LYCORIS HYBRIDS MADE IN JAPAN

Ei-ichi Takemura, *Tokyo University of Education,*
*Otsura, Tokyo, Japan*

## F-1 HYBRID BETWEEN **LYCORIS SPRENGERI & STRAMINEA**

[The following summary is taken from an article published by Dr. Takemura in The Botanical Magazine, Tokyo, Vol. 74. pp. 524-531. 1961.—*Editor*]

### SUMMARY

1. Morphological and cytological studies were carried out on the F-1 plants raised from the cross, *Lycoris sprengeri* Comes ($2n=22=22R^*$) x *L. straminea* Lindl. ($2n=16=6V^{**}+10R$.)

2. The outer appearance of the F-1 hybrid was found to be intermediate between both parent plants, while it resembled more or less closely the pollen parent. *L. straminea.*

3. The chromosome number in somatic cells of the F-1 plant was

19=3V+16R, i.e., the sum of the numbers in gametic cells of both parents.

4. At the 1st metaphase in microsporogenesis of the F-1 plants, 3 heteromorphic triplets and 5 bivalents have been commonly observed.

5. The F-1 plants were shown to be completely sterile in all selfing experiments.

6. From the number, shape and behavior of the chromosomes in meiotic division, it is suggested that this artificial hybrid seems to be a diploid form of *L. squamigera* Maxim.

7. The synoptic behavior between V-shaped and rod-shaped chromosomes in this hybrid seems to support Inariyama's view that in the genus *Lycoris* one V-shaped chromosome is equivalent to two rod-shaped ones, and, therefore, the former might have been derived by the fusion of the latter two.

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* R signifies rod-shaped chromosomes.
** V signifies V-shaped chromosomes.

## HYBRIDS BETWEEN **LYCORIS** SPECIES

[The following summary is taken from an article published by Dr. Takemura in The Botanical Magazine, Tokyo, Vol. 75: 72—79. 1962.—*Editor*]

### SUMMARY

1. Morphological and cytological studies were made on the interspecific hybrids raised from the following crosses:
    - *Lycoris sprengeri* Comes (2n=22=22R) x *Lycoris radiata* Herb. var. *pumila* Hort. [= *Lycoris radiata*—type.—*Ed.*]—Hybrid (1)
    - *Lycoris sanguinea Maxim.* (2n=22=22R) x *Lycoris radiata* Herb. var. *pumila* Hort. [= *Lycoris radiata*—type.—*Ed.*]—Hybrid (2)
    - *Lycoris sprengeri Comes* (2n=22=22R) x *Lycoris sanguinea* Maxim. (2n=22=22R)—Hybrid (3)

2. The outer appearance of these hybrids was intermediate between both parent plants, and Hybrid (1) resembled rather closely the mother plant, *L. sprengeri.*

3. The chromosome number in somatic cells of these hybrids was found as 22=R, i.e., the sum of the numbers in gametic cells of both parents.

4. These hybrid plants were all shown to be fertile in selfing experiments.

5. In Hybrid (3), the color of the perigone is expressed by two anthocyanins, i.e., cyanidin and pelargonidin derivatives. These pigments are identical with those contained in both parents, *L. sprengeri* (cyanidin) and *L. sanguinea* (pelargonidin), respectively. Therefore, the general concept that cyanidin is dominant over pelargonidin does not hold in this hybridization.

# BREEDING AMARYLLIDS IN NORTH GEORGIA

BECKWITH D. SMITH, *3479 Rockhaven Circle, N. E., Atlanta 5, Georgia*

Our hybrid Amaryllis bulbs, which were transported from Jacksonville, Florida in the fall of 1960 have apparently become acclimatized to the Atlanta temperatures, and this spring (1962) began showing buds in the outdoor planting about May 15th, and bloomed until the end of June. Flower scapes were exceptionally long, and blossoms large, typical of the Ludwig and other Dutch strains from which they were originated. One peculiarity, however, was that the bulbs "threw" a majority of two blooms as a rule, instead of the usual normal four blooms on smaller scapes when they were grown in North Florida. At first I thought that there may have been something to cause this manner of blooming in the heavy mulching required to protect the bulbs from freezing, as they were first covered with dairy fertilizer, with an additional top dressing of well rotted sawdust, thus being more deeply settled in the clay planting soil. But I am told that this has nothing to do with the 2-flowered scapes—buds are set a year or more in advance during the summer growth period and develop slowly in the bulb and then emerge a year or more later.

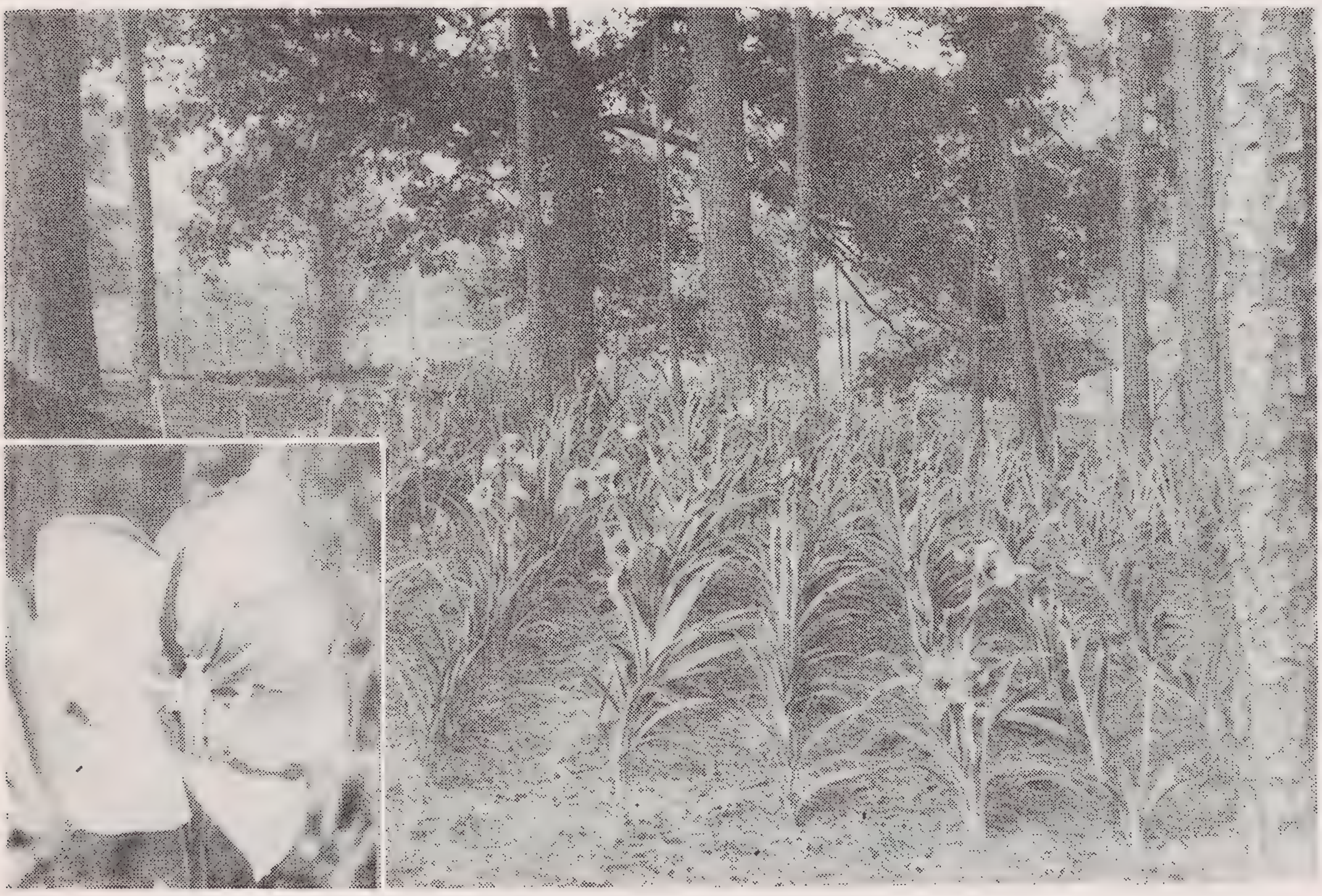

Fig. 15. Hybrid Amaryllis originated by Beckwith D. Smith, Atlanta, Georgia. Seedlings grown outdoors; and lower left, 8-seged hybrid. All flowered June 1962. Photos by the originator.

In Florida, we had to combat the large, multi-colored "Lubber" grasshoppers. In our planting here, we have a large striped snail, as well as the common black slug to fight, which attack the Amaryllis buds at ground level, as well as the leaves when they appear. However, copious applications of Snarol pellets keep them under control when they appear in the garden.

We have taken numerous black and white photographs of the Amaryllis in flower this spring, which show the abundant growth of foliage, scapes and flowers in an area of our garden which is ringed with tall pine trees (see Figs. 15 and 16).

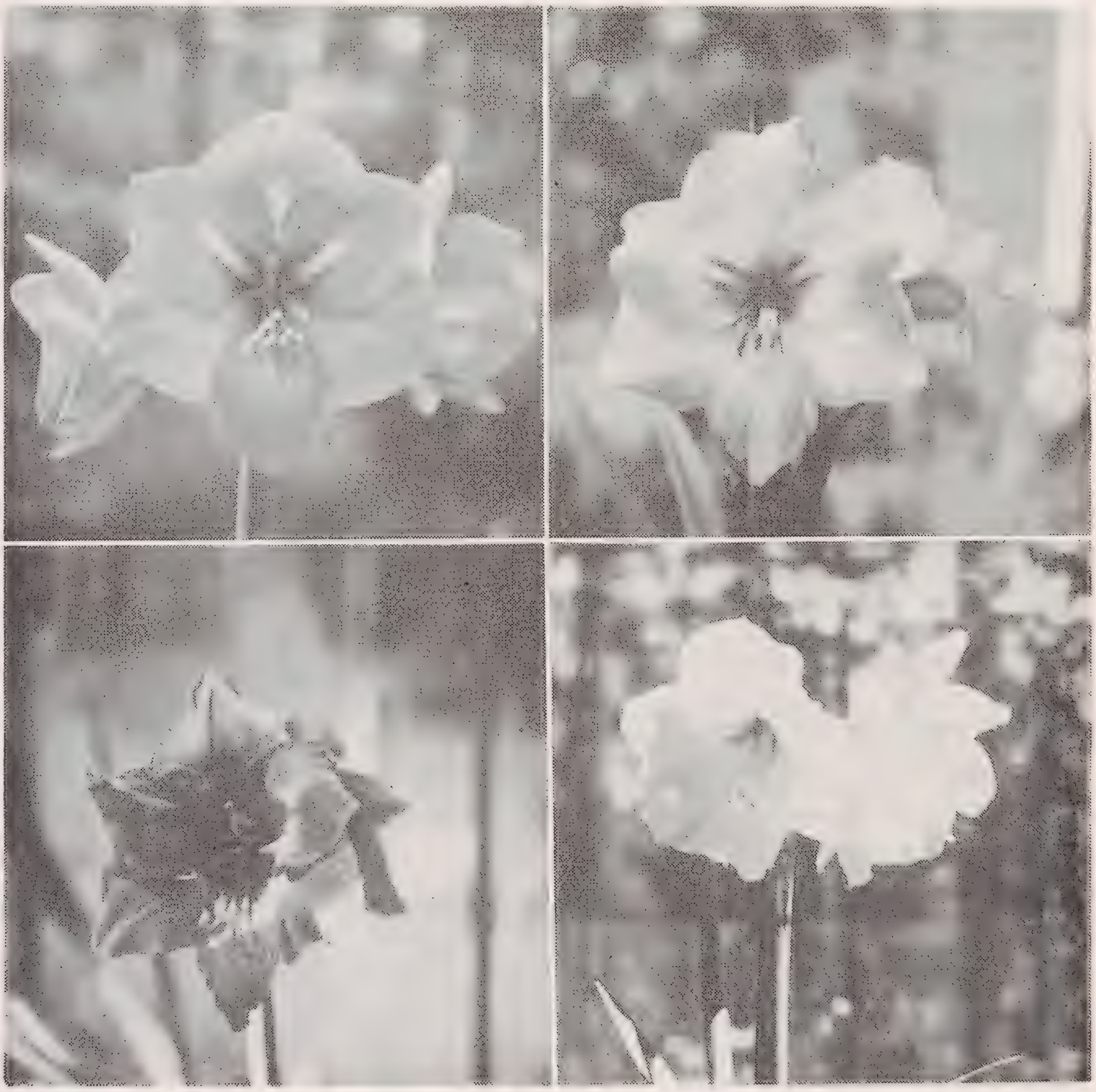

Fig. 16. Hybrid Amaryllis originated by Beckwith D. Smith, Atlanta, Georgia. Upper left, tangerine colored with white ribs; upper right, bi-color, rose and white; lower left, *Amaryllis* x *johnsonii* x *A. psittacina* hybrid, metallic red; lower right, peach-colored. All flowered April to June, 1962. Photos by the originator.

Mention has been made in a previous article submitted for Herbertia of trials which we have been running in the greenhouse of hybrid Amaryllis originated by Mrs. J. S. Barry, of Route 1, Box 7, Prairieville, Louisiana. Mrs. Barry has with meticulous and loving care developed some remarkably beautiful flowers from bulbs of her own crossing, using named clones, species and seedling cultivars. Our trial bulbs were received from Prairieville in the fall of 1961, most with roots intact, and were held for a period of time in cool dry storage and then potted up and benched in the heated greenhouse. Since heat was held to a minimum of between forty-five and fifty degrees during night hours, and cut very low during daytime sunlight hours, the purpose being to establish root growth, the bulbs began to show activity around the middle of February. Then, on April 2nd, the first bulb bloomed, and thereafter in succession so that we had blooms continuously until the last bud opened in the greenhouse on April 26th. The following is the order of bloom from the most outstanding crosses of Mrs. Barry's hybrids:

(1) *A. striata* X 'Maria Goretti', 2 flowers, Orient Red, with small stripe in throat. (2) *A. striata* X 'Maria Goretti'. 3 flowers, Rose, with small stripe in throat. (3) 'Candy Cane' X 'Silver Lining'. 4 flowers, bright Red, bearded, and with green throat. (4) White Seedling X 'White Giant'. 4 flowers, brilliant White with green throat. (5) 'Ludwig's 'It' X 'Brilliant'. 4 flowers, lovely Rose. (6) *A. striata* X 'Maria Goretti'. 4 flowers, good Red, with green throat. (7) Van Meeuwen red and white Seedling X 'Five Star General'. 4 flowers, Oxblood Red. (8) White Howard and Smith Seedling X 'Maria Goretti'. 4 flowers, gleaming White, with stitched Pink picotee edging. Fragrant! (9) *A. johnsonii* X 'Ludwig's Goliath,' 4 flowers, Salmon Red miniature. Second scape two flowers. (10) 'Ludwig's Goliath' X 'Caruso'. 4 flowers, Orange Red. (11) 'Maria Goretti' X 'White Giant'. 4 flowers, clean White with green throat. Fragrant! (12) 'Salmon Joy' X 'Bouquet'. 4 flowers, Rose Pink. (13) 'Caruso' X 'Champion's Reward'. 4 flowers, Orange Red. (14) White Seedling X 'White Giant'. 4 flowers, clear White with green throat. (15) 'Margaret Truman' X 'Pink Favorite'. 4 flowers, a large, gorgeous shell Pink. (16) 'Ludwig's 'It' X 'American Express'. 4 flowers, large, attractive Red, with darker Red in throat. (17) *A. johnsonii* X 'Ludwig's Goliath'. 4 flowers, dark Red, small stripe in throat.

It can be seen from the above that Mrs. Barry has carefully selected some of the best seed and pollen parents, and the results obtained were most successful in the writer's opinion, to say the least. Others of her hybrids were also tested, but are not covered here because they did not bloom during the time of testing. Individuals who are interested in obtaining bulbs of the above crosses should communicate with Mrs. Barry direct. Hybridizers and collectors of Amaryllis will find much in her wide variety of hybrids for the improvement and development of their own clones.

We have now been in Georgia for two years, and during this time have made numerous appearances before Atlanta garden clubs, extolling the pleasant virtues of growing more beautiful *Amaryllis.* We have shown our colored slides to all who care to see them, giving cultural information and tips on growing from our own experience, and hope that in some measure have brought more interest to the cause of growing and enjoying them. While North Georgia is quite cold in winter, adequate mulching will protect bulbs outside, as we have found from two seasons. We are constantly urging that all Georgians and Amaryllidarians everywhere become interested in better growing, hybridizing and understanding of these "beautiful ladies" of the flower garden, for here is the soul and essence of nature.

## WHY NOT AMARYLLIS THE YEAR 'ROUND?

V. Roger Fesmire, *1170 South Xavier St., Denver 19, Colorado*

When I moved my family from Pennsylvania to Colorado many years ago, I brought with me close to a hundred Amaryllis bulbs of various sizes which had been grown in Pennsylvania by being planted in the garden in summer and stored dry over winter. However, this type of culture was not successful in Colorado, probably because of the shorter growing season, and most of the bulbs were finally lost with the exception of a red Dutch hybrid and some bulbs purchased from Mr. Houdyshel under the label of "Rutila hybrids".

When a small greenhouse was secured several years ago, I promptly returned to growing Amaryllis, and in the greenhouse their performance has surpassed all expectations. Kept in the greenhouse all year around, grown in pots and well fertilized, and with partial shading from the brilliant sunshine, the bulbs make luxuriant growth. The temperature ranges in summer from about 60 degrees to 90 degrees, and in winter from about 55 degrees to 75 degrees. The bulbs are rested in the fall by decreasing the amount of water given. This past season, flower buds began to appear in December, and there were Amaryllis in bloom from January 1 to about May 1, 1962, the majority of the bulbs sending up two or three flower scapes. These bulbs included Dutch, Indian, Japanese, and American hybrids, my original Striata (Rutila) hybrids, and what is apparently a form of Amaryllis Belladonna. Acquired too late to bloom were some South African and Howard and Smith hybrids.

From comments in the Amaryllis Year Books, it is evident that those who raise Amaryllis in large numbers enjoy some flowers all through the year. This is not possible of course with only a small greenhouse, although it would be very desirable. Therefore, I have embarked upon a three-point program designed to achieve the same results in other ways than mere quantity.

*First*, by planned management it should be possible to spread out considerably the blooming period of whatever bulbs one may possess, enlarging upon the suggestions of Luyten in Volume 12 of Herbertia. Accordingly, this coming fall of 1962 those bulbs which were the first to send up new growth last winter will be dried off several months in advance of the bulk of my bulbs, in the hope that they will come into bloom several months sooner than the others. Another phase of this experiment will be to keep some bulbs at a lower temperature during the winter months, which may delay their blooming somewhat, perhaps until early summer.

In the fall of 1961, an experiment was performed with three bulbs which were offsets of one original Striate hybrid. One bulb was dried off completely, one watered every other week, and one not rested at all. Although the bulb which was completely dried off bloomed only two weeks sooner than the bulb which was not rested at all, the new foliage of this bulb was fully developed by May, at which time new growth was just beginning with the bulb that had not been rested. Hence it appears probable that one of these bulbs can be brought into bloom again several months before the other one. In time it may be possible to have these Striata hybrids in bloom all through the year, particularly since I have a number of these bulbs.

*Second,* by breeding of species or hybrids which have a tendency to bloom more than once in a year, it may be possible to develop strains which will be recurrent bloomers. Such hybrids will probably be evergreen as to foliage, and with flowers in the small to medium size range, which would make them quite desirable for the small greenhouse and the home. If the foliage could also be reduced in size, the plants would be ideal in a small greenhouse. At present I have three Amaryllis which display a tendency to recurrent blooming: the Striata hybrids, a form of Amaryllis Belladonna, and a hybrid from India which this year sent up new foliage and a flower stalk both in January and again in June. Therefore, my breeding program so far has primarily been along this line, and has involved crosses between these three Amaryllis and other hybrids which I possess, although it would be very desirable to acquire more breeding stock of this type. Since this program was only developed about one year ago, no seedlings have as yet come into bloom, but they are growing vigorously.

*Third,* by breeding present hybrids with species which bloom naturally in the summer, or fall, or winter seasons, hybrid strains should be produced which will bloom naturally at these various seasons. Here of course the primary difficulty is the fact that very few such species are available.

This three-point program has opened up entirely new avenues of interest and enjoyment for me. Perhaps worthwhile results may be obtained eventually, and I look forward with keen anticipation to the future. All suggestions will be most welcome.

## BREEDING BRUNSVIGIAS AND X CRINODONNAS

Mrs. Kenneth B. Anderson, *California*

September is a wonderful month for those who love the fall blooming amaryllids. Even tho the most of them bloom entirely without foliage, they are very bright, pert and cheerful on these very hot days when nearly everything else is wilting.

Brunsvigias come up in the driest of places, having had no watering whatever since spring. I can't help but wonder what triggers the growth mechanism, what set of circumstances cause it to know that it is time to bloom! It certainly isn't a change in temperature or in length of day or in earth moisture, yet they unfailingly push up their buds at the same time each year—the common cape belladonna first in mid August, follwed shortly by all the hybrids and lastly the Brunsvigia Rosea minor which finishes the season. Incidentally those Brunsvigias which happen to be planted in beds which are watered all summer, have the same time schedule, and seem to bloom the same as those that have remained dry all summer.

I've had a few more variations this summer among the new seedlings, but it is probably going to take years of breeding to get much more variation than there already is. We now have pure whites thru pink, rose, cerise, raspberry and coppery tones. We have pattern variations and pure self colors in all these shades. We have whites with yellow throats, with green throats and apricot throats, whites with picotee edges of pink or red, whites with wide rims of pink or red, whites with delicately pencilled rose or red markings on the tips and whites with brilliant fingernail polished tips. The color on many of these flowers, as they age, suffuses into the white and becomes a deep rosy color thruout, while others keep the original pattern almost till they wither. There are pink flowers with candy stripes of red down the rib or with just a blotch of the red near the tip and then there are deep rose flowers and deep raspberry flowers with throats suffused with apricot or copper color which also shows thru on the outside of the flower.

Shapes vary from thin spidery segmented ones, to wide rounded overlapping petalled ones, from trumpet shapes to flat open faces and chalice cups. There are formal, crisp, pointed petals or relaxed looking twisted ones, gently waved ones and very ruffly ones, reflexed tips and non-reflexed ones.

Sizes vary too; we have a whole race of small dainty flowers on slim stems and we have giants, chest high with large and sometimes gross flowers, and many sizes in between.

The number of flowers in each head varies too, some have as few as 4 or as many as 28. Those with fewer flowers generally face in one quarter of the circle toward the Southwest, while most of the whites and many of the multifloras open in a full circle with flowers facing all 380°. They certainly love the sun, those under trees or bushes bend so far to the South that they're finally lying on the ground, but with heads up reaching for light.

The weather certainly does affect them. In changeable weather I find I have to change the description on the labels frequently. On several dull days in a row I labeled some newly opened flowers ''white with crimson tips, throat remains white on aging'' or ''small dainty white with pink pencilled edge.'' Suddenly out comes the sun and 90° heat and the first one changes to ''white with rose edge becoming all rose on third day'' and second one with its small dainty white flowers all of a sudden produces in its umbell a giant pink blossom looking ludicrous in amongst its tiny sisters. No wonder one of the bulbs Les Hannibal gave me is labelled ''Variable''.

About mid September the Crinodonnas (crosses between Crinum and Brunsvigias) come into flower. These are particularly lovely because they have their deep green, neat clumps of foliage to set them off.

The majority of these from my first cross of Crinum Moorei (pink form) on Brunsvigia Rosea minor, are in the soft shades of pink and rose, and two quite deep raspberry colored ones. These flowers do not have much variation in pattern as the Brunsvigias do. My other cross, Crinum Moorei. (light form) on the white Brunsvigia x Parkeri (multiflora alba) is giving lighter flowers; one pure white, one white with narrow picotee edge of pink, others in shades of light pink.

The white one, 30″ high, has 10 flowers (+ 7 aborted ones) large trumpet shape, petals slightly twisted but fairly open faced nonetheless.

Another, white with picotee edge, has 8 flowers (+ 7 aborted) has a pink bud, opens with the narrow rose picotee edge and brilliant rose tipped pistil. If the day is sunny all color fades to pure white except the pistil tip.

Another white opens with very deep carmine tips, fairly wide petals and the red fades into the white as it ages and becomes a wholly rose colored flower.

The deep colored Crinodonnas tend to have more flowers, I've counted up to 28 buds. Two of these have flowers which open up very nicely into an open faced trumpet shape. One of these I consider my best result in breeding so far; 48 inches tall and of a color close to that of Ellen Bosanquet.

It is strange that some seedlings never have bloomed. Those which have bloomed took only 4 or 5 years from seed. I expected the rest to bloom within the next few years, but one is 16 years old now and hasn't bloomed, others are 11 years old with no bloom. The others bloom regularly year after year, with several stalks and many increases. They are large clumps now of deep green foliage, quite erect and of good substance.

The fact that the Crinodonnas are sterile, makes me wonder if the bees are aware of this. I watched a huge black bumble bee visiting the Brunsvigia flowers and he'd occasionally fly to the Crinodonna, buzz all around it a bit, then fly back to the Brunsvigias. Evidently the Crinodonnas smelled good but just didn't have what it takes.

After the first thorough deep watering of beds which have been left dry all summer, the rest of the little amaryllids of my garden push up their heads for September bloom. Habranthus brachyandrus and Rhodophiala spathacea come up immediately the second day after watering and within 5 days are in full bloom. Shortly after, the oxblood lily, Rhodolphiala bifida (red form) appears and then in rapid succession come Lycoris radiata, Habranthus texana, Zephyranthes candida, Leucojum Autumnale and a few early Sternbergia luteas, and hybrid nerines.

Meanwhile the Crinums have been blooming all summer and are still sending forth more scapes to compete with the other amaryllids. Ellen Bosanquet, both pink and light Mooreis, continue to tempt me to make more Crinodonna crosses in order that another September can bring forth more surprizes and more pleasure and more hopes for the future.

[GRUBBS—AMATEUR'S GROWING PAINS, continued from page 131.]

nursing them there will eventually be healthy plants. None of these have bloomed yet but seedlings of 'Violetta' self-pollinated produce off sets freely.

I have two clones of *Amaryllis belladonna* (syn. equestris), bright scarlet, which I would call a miniature. I bought one under the name of Barbados Lily, and the other was called ''equestris''. They are alike. These crossed readily with *Amaryllis evansiae*. It will be two or three years before these are ready to bloom.

Two other amaryllis I wish to use for hybridizing are *A. ambigua* and *Amaryllis* x *johnsonii*. You already know the trouble I am having getting these to grow and bloom, therefore about all I can say is: I have grown some remarkably beautiful flowers, have had an enjoyable experience and have some hybrids that, while not outstandingly different from others that are available, are a definite improvement over the Meade strain and other cheaper bulbs sold in garden stores. Many of them have one or more of the following traits: large size, good substance, good form, good color and rapid propagation. By combining the best of these traits by further crossing I have some hopes of having a very good collection of my own amaryllis. Perhaps when they are more readily available I can acquire other species to add some new trait to the strain.

My increasing success with outdoor culture is facilitating my hybridization program because I cannot handle any more plants in the greenhouse. I have had to discard a considerable number of bulbs grown in my outside beds because they appeared to have the Mosaic disease. I am very much inclined to believe that this diseased condition is either caused or carried about by spider mites. They are the most plentiful and persistent insect pests in this area. One other pest that is very destructive in the outside beds is the *Narcissus* bulb fly. Thanks to Dr. Traub's Amaryllis Manual I now have this pest under control, at least for the present.

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## PALESTINE (TEX.) AMARYLLIS SOCIETY FOUNDED

As we go to press word has been received that The Palestine (Tex.) Amaryllis Society was organized on February 5, 1963. It is affiliated with the American Amaryllis Society. The officers are: Miss Lucy Woods, Pres., Mrs. Arcala Harrington, Secy., and Mrs. J. H. Handorf, Treas. We all extend our congratulations.

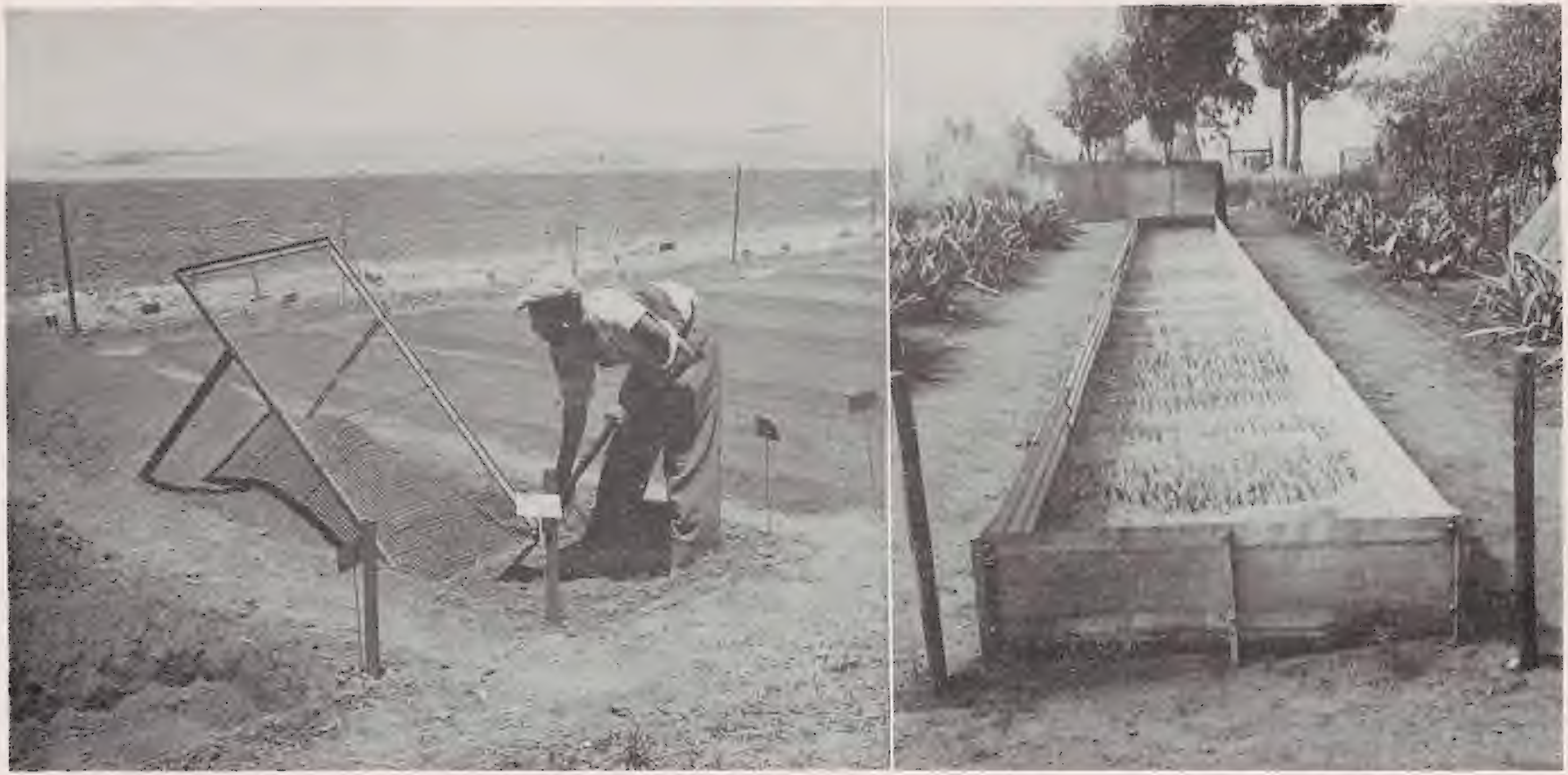

Fig. 17. Left, Wire screen in ¾ inch-mesh set in steel frame for sifting soil used in the initial preparation of the beds. Right, seed bed inclosed on the sides with corrugated steel sheets cut lengthwise in half and bolted on the angle iron standards firmly planted in the ground.

# 4. AMARYLLID CULTURE

[REGIONAL ADAPTATION, SOILS, FERTILIZATION, IRRIGATION, USE IN LANDSCAPE, DISEASE AND INSECT CONTROL, ETC.]

## AMARYLLIS CULTURE & BREEDING IN SOUTH AFRICA

Leon Boshoff-Mostert

*'Kleinskuur', Balfour, Transvaal, South Africa*

### *INTRODUCTION.*

When I asked your Editor what he wished me to write about in my promised article for the next Year Book, he left me a wide open field embracing breeding and culture in almost all their aspects related to the practical approach as applied by me here at Kleinskuur. Paradoxically, such a mandate is both easy and difficult to discharge. Easy, because it amounts to a mere narrative of daily and seasonal activities and yet, difficult, because of charishness that dogmatism might inadvertently be ascribed to personal methods of procedure where it is not intended.

Other than in basic principles, it is imprudent and may even be harmful to lay down hard and fast rules. Just as in the field of medicine and dietetics divergent treatments may have equally beneficial results, so also in the field of horticulture different circumstances, conditions and climatic variations call for divergent methods in culture. It must, therefore, be appreciated that this article is not to be seen as an attempt pedantically to tell the reader what he should do, but rather as an endeavour to tell the reader what someone else is doing according to the dictates of conditions applying to his particular geographic sphere of operation. As an example, let us touch very briefly on the question of potted bulbs.

The thought will never occur to me to submerge potted bulbs in open beds during Spring and Summer and then to retrieve them in Autumn for Winter storage in the warm cellar, awaiting the return of favourable climatic conditions for the repetition of the cycle. And yet, this is exactly what I witnessed during my visit to your Mid-West with its extreme Winters.

With the application of some degree of common sense, however, much of what is being done on the Eastern Transvaal Highveld where I live, can be put into practice in other regions without much or perhaps any modification.

Let us not concern ourselves with what comes first, the seed or the bulb, but let us commence somewhere in-between, namely, with the bloom from which we intend gathering seeds for natural propagation of new varieties.

### *CHOICE OF PARENTS.*

(a) *Colour:* It is axiomatic that parents will be selected only from bulbs displaying those attributes which in the eyes of the breeder hold potentialities of producing that which will lead ultimately to the apex of perfection as seen in the light of present-day standards. I repeat ''in the eyes of the breeder'', since, fortunately, tastes vary and consequently we have the spice in variety. Having regard to the element of taste, I shall not venture on the dangerous terrain of preference, bias or prejudice. I would, therefore, advise that irrespective of your neighbour's opinion on the matter, you just go for your own colours. Since it is the first thing to catch the eye, colour is of utmost importance. As one considers the progress left to us as a legacy by students, breeders and writers during the past century or more, one cannot but conclude that the ultimate in perfection is in sight in many aspects of breeding and that the scope for active endeavour lies more in the direction of evolving new colours and enhancing their beauty as regards clarity, shading and depth and the creation of attractive blends and combinations of colours.

(b) *Texture:* In the textural field, the scope is not as expansive as in the case of colour. It must be obvious, however, that texture plays an important role in the presentation of a bloom and can become an additional instrument in the creation of variety, even in blooms with identical colouring. A glossy texture portrays a radiant glow, whereas the seersucker or crepe texture stirs up a feeling of sympathetic warmth. Boldness, on the other hand, is inherent in the bloom with heavily veined texture, more especially in the monochromes where the veining stands out in deeper tones. Then again, a leathery texture brings an illusion of increased size, whereas the velvety texture creates different shades or tones of colour depending on the angle of reflected light. These variations in texture are latent in the general cross-section of the hybrid we have to-day and it lies in the hands of the hybridist to bring these characteristics into prominence.

(c) *Substance:* The importance of the lasting properties of a bloom should not be overlooked. This applies in particular to the fancier who wishes to display on the show bench. Nothing can be so distracting as a wilting floret next to a later one just in the process of unfolding to the full glory of its beauty. Through selective breeding by the introduction of pollen from stronger parents, such shortcomings can eventually be overcome.

(d) *Size and Form:* During the past few decades hybridists have conscientiously been concentrating on form and size as much as on any other aspect of the Amaryllis. Much of the crane neck and trumpet shape has been outbred. Wider and rounder segs remain the target and the flat open face will continue to allure the breeder.

(e) *Vigour of Plant Growth:* A vital consideration in planned breeding is vigour. In your pollination programme do not play around with the runts, with short and weak scapes, unless you have one with some singular property worthy of perpetuation. In that event, by all means concentrate on the introduction of such property in one or more of your presentable vigorous specimens lacking in that enviable attraction. The majority of the offspring will, no doubt, also be runts but the possibility is always present that you may strike it lucky with the right mutation of genes which no man can forecast.

In the foregoing paragraphs I have listed the basic factors for consideration in breeding. It now rests with you to formulate your own creative aims and choose the parent plants accordingly, bearing in mind that the possibility of the combination of the attractive attributes of the respective parents in their issue is always present. Results, alas, are such that one often becomes disheartened by failures. But just think of the encouraging consolation that in our common heterogeneous make-up of humanity, beauty contest winners are born regularly in every country, whilst even the generous crop of runners-up remains the envy of many a male heart!

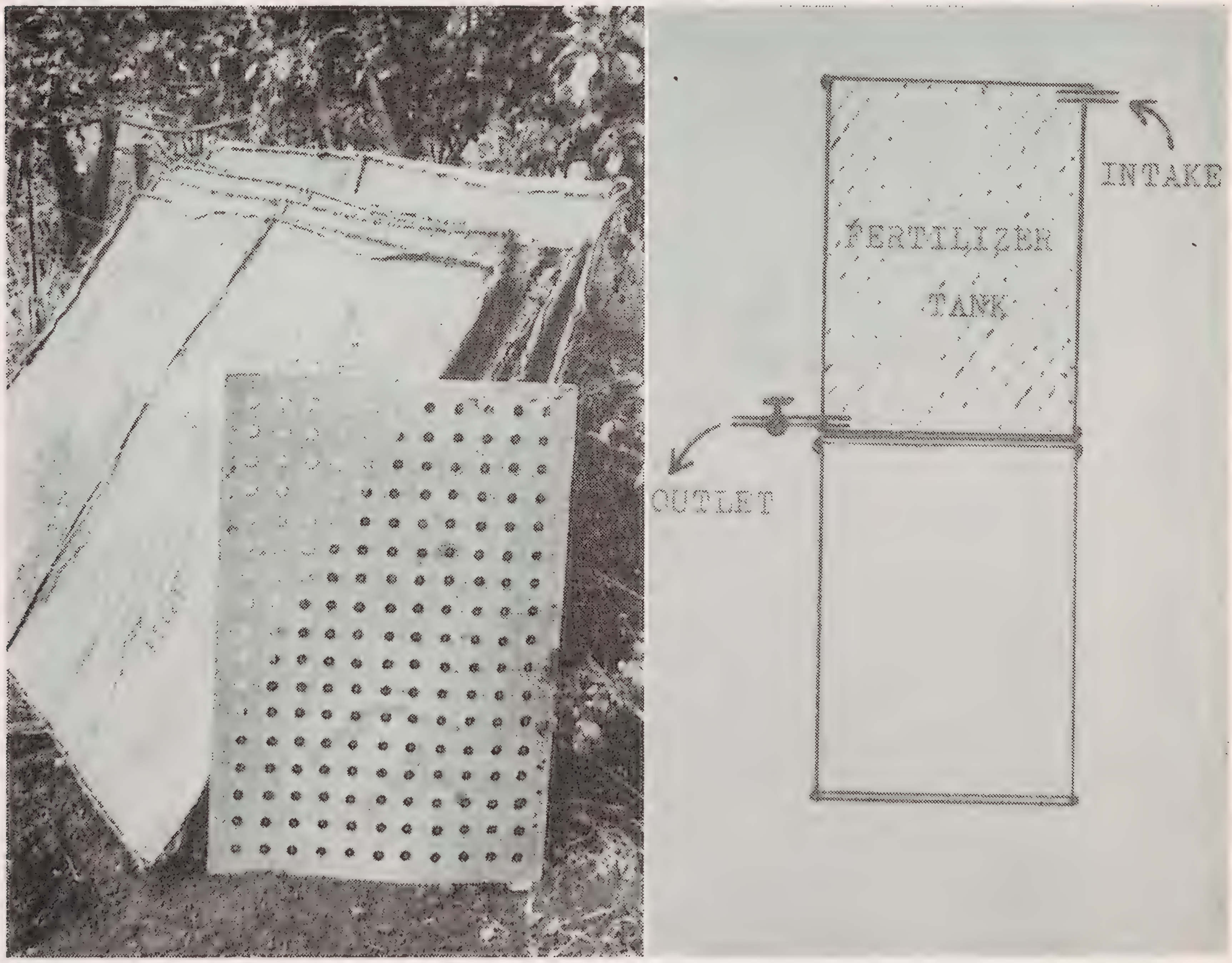

Fig. 18. Left, pressed-wood planting board with holes spaced 2 inches apart; behind this are stacked some of the steel framed hessian covers used for protection against frost and hail. Right, mobile fertilizer tank on empty drum which serves as a tank stand.

Whilst writing this, I lay no claim to being a student of genetics and neither do I profess to be an authoritative hybridist. I have learned from others, from the writing of others and, particularly, from the experience of my own few successes and countless failures over the past fourteen years during which my attention and energies have been devoted almost entirely to my Amaryllis.

Whilst in the U. S. A., I had the singular privilege of extensive talks in La Jolla, California, with a man whom everyone knows to be an expert on Amaryllis and whom I, personally, regard as the greatest authority of all time in that sphere. It was from Dr. Traub that I learned, amongst many other things, about the storage of pollen in gelatin capsules in the refrigerator. Consequently, over the past two seasons I have successfully applied pollen to blooms up to eight weeks after the paternal bulb had finished blooming.

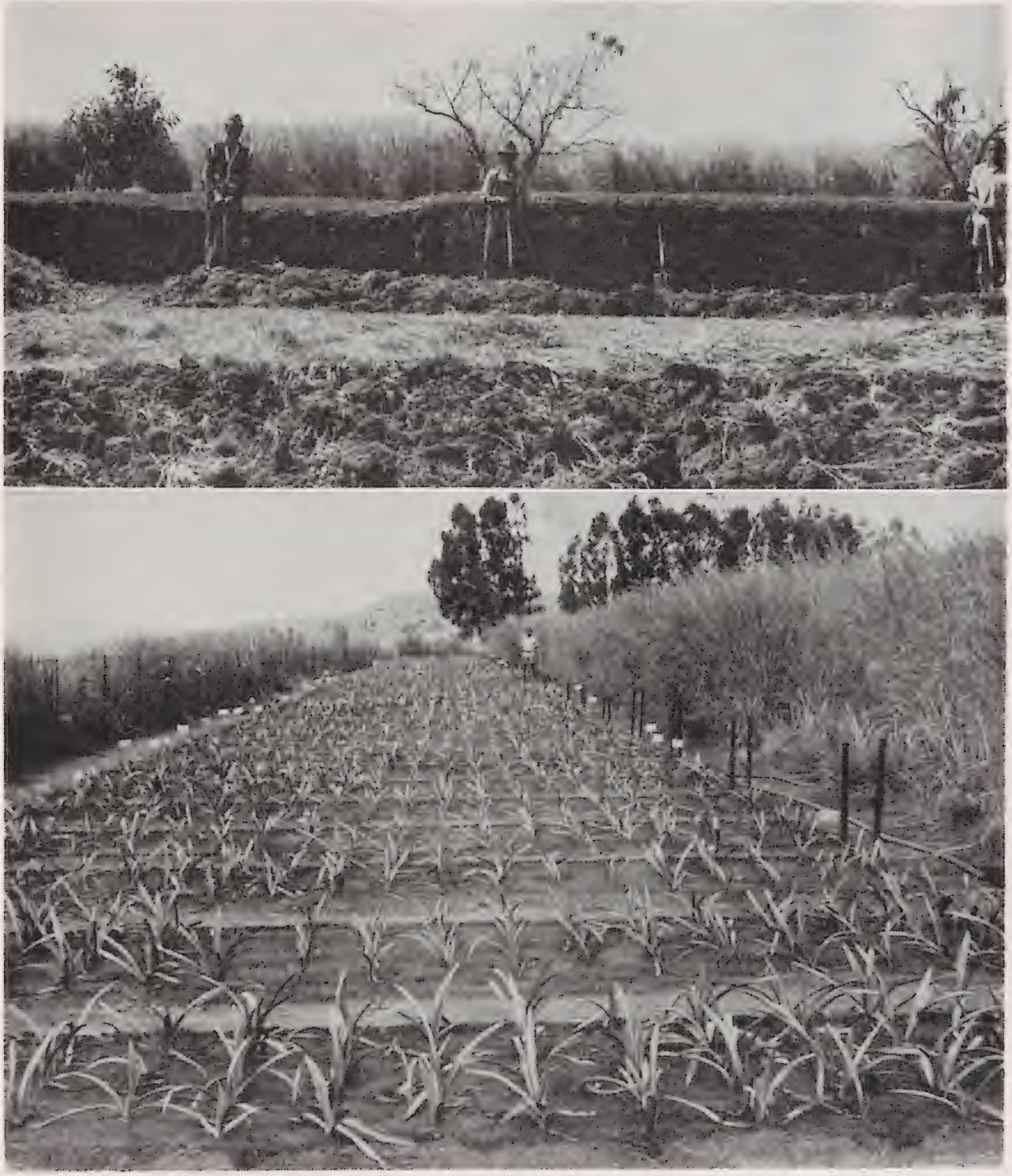

Fig. 19. Upper, farm helpers commencing with first turning over of a compost heap 50 ft. long, 4 ft. high and 6 ft. wide. Lower, center, young bulbs in second season growing in open beds; right, a fine stand of Tamboekie grass for winter covering of open *Amaryllis* beds.

A further valuable breeding hint given me by Dr. Traub was the collective gathering of pollen from chosen parents in a common capsule and the application of this admixture of pollen to the chosen mothers. All the breeders I have thus far met have a common regret, viz. the short span of their lives. But in this advice I find a short cut in breeding which to a large measure defeats the obstacles presented by the limitations of the allotted "three score and ten years". It is with keen anticipation that I await the first blooms from the results of my collective pollination.

## *PLANTING OF SEEDS*

A suitable medium for the seeds is essential and seed pans and seed beds should be prepared even before the pollination programme commences, so that the seeds may be planted as soon as possible after maturity. My experience is that the longer the seeds are kept after maturity, the smaller the percentage of germination. As for suitable media, so much has already been written and literature on this subject is readily available in abundance. I shall, therefore, confine myself for the purpose of this article to my own methods of propagation.

Since I propagate from seeds on a relatively large scale for a one-man outfit, and personally have to attend to all the planting and aftercare, I seldom make use of seed pans. With very rare exceptions the seeds are planted in beds in the nursery. Efficient drainage must be ensured whilst at the same time the beds must remain sufficiently moist to ensure optimum germination and speedy initial development.

Our soil here is of a heavy, tight, texture which quickly dries with a hard upper crust and proper preparation of the beds becomes necessary. In the intended seed beds are worked in liberal applications of coarse sharp river sand, peat moss, vermiculite and well decayed compost prepared from vegetable matter and animal manure. These four ingredients are applied in equal proportions in bulk, i.e., a layer of two inches of each, one on top of another, is spread over the entire surface of the bed. It is then thoroughly worked through with garden forks and subsequently screened to a depth of fourteen inches through a portable upright sieve of ¾ inch mesh (see Fig. 17).

To afford protection against frost and hail, the beds are enclosed in sides of metal sheeting. For this purpose corrugated steel or aluminum sheets, lengthwise cut in half, are used (see Fig 17). These sheets are rigidly attached to and supported by angle iron sections firmly planted into the soil along the sides of the beds, thus giving a complete substantial structure. As the entire erection is set up with bolts, it lends itself readily to dismantling and conveyance to other locations later on.

For the provision of top covering, portable frames constructed of ⅜ inch round mild steel bars are covered with ½ inch mesh wire netting and over this is stretched and sewn on a covering of hessian (see Fig. 18).

The seedlings not only survive our Winter frosts in these seed beds but they continue growing, provided they are covered at night with the hessian frames which are easily handled by one man and, during the day, when the seedlings enjoy full sunshine, are conveniently stacked close to the beds. Since we live in a summer hail belt, the covering can also be quickly applied in the event of hail storms. Incidentally, I have a special patch of 7 beds of mature bulbs, each bed being 4 feet by 45 feet, completely covered under fine mesh wire netting as a permanent protection against hail (see Fig. 20). In these beds I have bulbs representing all my varieties and the unit is virtually a show window for visitors in the event of the open beds being damaged by hail during the blooming season, when visitors from all parts of the country come here by the hundreds.

It has already been stated that the seed beds are prepared well in advance. They are then regularly watered to induce germination of any weed seeds that may be in the soil and compost. These are soon under control and the subsequent weeding, by the time the Amaryllis seeds germinate, is relatively insignificant.

The beds are carefully levelled with a plank and are now ready to receive the seeds. This past season I planted just over 12,000 seeds and planting commenced when the first seeds were ripe. The seeds are planted to a depth of about 3/8 inch and for this purpose a light board of pressed wood is used. It is cut to the width of the seed bed and the length may vary to taste or to the requirements of practical handling. I find a square board suitable for my purpose. Horizontal and vertical lines are drawn on the board at distances of 2 inches and holes of 3/4 inch diameter are drilled at each intersection of the lines, i.e. the holes are spaced at 2 inches in all directions (see Fig. 18).

An addditional planting instrument is a simple 4 inch length of dowel cut from 3/4 inch diameter round wood. This is inserted in one of the holes in the board and pushed through a distance of 3/8 inch on the under-side of the board, whilst a pencil mark is made on the dowel, level with the upper side of the board. A nail is driven through the dowel at the pencil mark and this prevents the dowel protruding more than 3/8 inch to the under-side when it is thrust through the holes in the board.

We are now ready to start planting and the board is laid flat on the seed bed. The seeds are placed singly into the holes and pressed into the soft friable medium, all to an equal depth of 3/8 inch, without damage to the seeds. It will be found that a slightly moist medium works best. After seeds have been pressed into all the holes, these are then filled up with a covering of a moisture retentive mixture of vemiculite peat moss and sand, level with the upper surface of the board. The board is then carefully lifted and shifted forward along the bed to receive the following batch of seeds. A liberal sprinkling of water is applied by means of a soft spray from a watering can equipped with a fine hose. The little round mounds of covering medium left by the holes in the planting board are soon washed level with the bed. This operation is repeated till all the seeds have been planted.

This method can also be applied in planting in seed pans. In that case, naturally, the board is cut much smaller to fit the pan. The advantages of this method of planting are manifold. It is a time saver. The seeds are all planted to an equal depth. The emerging seedlings are spaced at equal distances which simplifies subsequent weeding. Furthermore, the bed gives a neat and orderly appearance which is pleasing to the eye.

It will have been observed that chemical fertilizers were not introduced in the seed beds before planting and I do not propose to offer technical reasoning for this procedure. My own practice is to allow the seedlings to develop some measure of leaf and root growth and after six weeks or so from the time of germination, during all of which time the beds are constantly kept moist, I commence with applications of liquid manure or liquid fertilizer at 10 to 14 day intervals. Care is exercised to avoid an over-strong solution and the liquid feeding is always applied after a regular watering.

Your garden requisite stockist should be able to supply a suitable balanced fertilizer for liquid application and the strength of the solution is normally indicated on the container.

Since the plants are spaced at 2 inch distances, the bulblets may be left undisturbed in the seed beds for a year or longer and with proper care and feeding development is rapid and continuous. I have already had blooms from seedlings 23 months after planting but these, however, are rare exceptions. Normally, they start blooming from the third year onwards and, in slow maturing varieties, sometimes produce their blooms as late as in the sixth year. It is advisable not to remove the seedlings to their permanent beds until they have grown to a size of at least one inch in diameter. When lifting, handle with utmost care and endeavour to disturb or damage the roots as little as possible. Do not let them lie around but plant in the new location as quickly as possible after lifting and give a liberal initial watering.

### *PERMANENT BEDS.*

The size and the shape of the beds depend upon ones own taste, convenience and garden lay-out. Here at Kleinskuur all the beds are now 4 feet wide with five bulbs in the row and rows spaced one foot apart. The bulbs are spaced ten inches apart in the rows. Hand weeding and cultivation are done from both sides of the bed which means a maximum stretch of two feet to the centre of the bed. At present, there are 141 beds, all 4 feet wide and ranging in length from 20 to 45 feet. If all the beds were placed in one continuous line, it would extend over a distance of almost a mile.

Kleinskuur is a commercial undertaking and, consequently, there is a bigger than normal turnover of beds as a result of annual lifting and shipment of bulbs. But if a bed is well prepared in the first instance, there should be no reason for lifting and transplanting of bulbs for many years. The necessity for transplanting will be determined by the extent and speed of natural increase. For the best blooming results the bulbs should be lifted for division and transplanting only when overcrowding becomes evident and they start pushing one another out of the soil.

Extensive use is made here of compost prepared from green vegetable matter and cow manure which is in plentiful supply. This is prepared in the orthodox method of layering above ground and turning over at normal intervals (see Fig. 19).

In the initial preparation of a permanent bed, an even sprinkling of 5:13:5 is applied over the surface of the entire bed at the rate of 6 ounces per square yard and then lightly worked in with a garden fork. Then comes a 4 inch thick layer of well decayed compost thoroughly worked into the bed to a depth of 12 to 14 inches. At this stage my beds are sifted from end to end through the ¾ inch mesh screen. This, of course, is not essential provided the compost is equally distributed in the soil by repeated working with forks. The beds are then levelled off and the bulbs are planted.

Whereas in the case of potted plants in a sheltered location the bulb is set into the medium with up to half its 'body' above ground, this method is not advocated in the open beds. Here the bulb is planted to the depth of the curve of its 'shoulder' with the whole of the 'neck' protruding above ground.

With these beds additional application of fertilizers will not be necessary during the first season. With regular and sufficient watering, growth will be vigorous. As soon as the upper crust of the beds is sufficiently dry to permit of cultivation after each watering, the soil around the bulbs is lightly cultivated with suitable hand tools to a depth of 2 inches. This practice ensures better retention of moisture besides affording regular aeration of the upper layer of soil.

Throughout the growing season the beds are regularly irrigated. Here again, hard and fast rules must not be prescribed. Climatic and weather conditions alone will determine the frequency of watering. During the rainy season we are often not required to irrigate for a few weeks on end.

With the advent of Winter and the fall of the first frost, the bulbs enter the dormant period and all watering is discontinued. The beds are covered then with a thick layer of grass which serves as a Winter blanket. For this purpose and to eliminate transport, I have planted stretches of suitable perennial indigenous Tamboekie grass adjacent to the beds (see Fig. 19). In early Spring the grass is removed and neatly stacked and the beds are again irrigated. Much of the food in the soil has by now been consumed after the first year of luscious growth of bulbs and the need for fertilizing must be considered.

There are so many proved methods of fertilizing established beds, such as mulching with rich compost or spreading of fertilizer between the bulbs and then working into the top layers of the soil. My mind, however, is continuously exercised in the direction of labour-saving methods and devices. Although I can say nothing against the proved conventional methods of provision of additional plant foods, I find it easier and more convenient to apply liquid feeding. I am also convinced that liquid fertilizer is more readily assimilated and since irrigation is done here by an open hose-pipe laid on the beds and continuously shifted along the length of the beds, the liquid fertilizer is introduced in a similar manner.

Two fertilizing tanks have been constructed which operate in conjunction with each other. Whilst the one dispenses liquid fertilizer, the other is at the same time being filled up with water. The tank is made from a regular 44 gallon oil drum with an open top. It has a short piece of 1 inch piping welded into the side just below the upper open brim and this acts as the water intake pipe. Another piece of similar pipe is welded into the side at the bottom end and this is the outlet pipe which is fitted with a stop-cock (see Fig. 18). The bottom stop-cock is closed and the tank is filled with water almost to the top by means of a hosepipe attached to the upper inlet pipe.

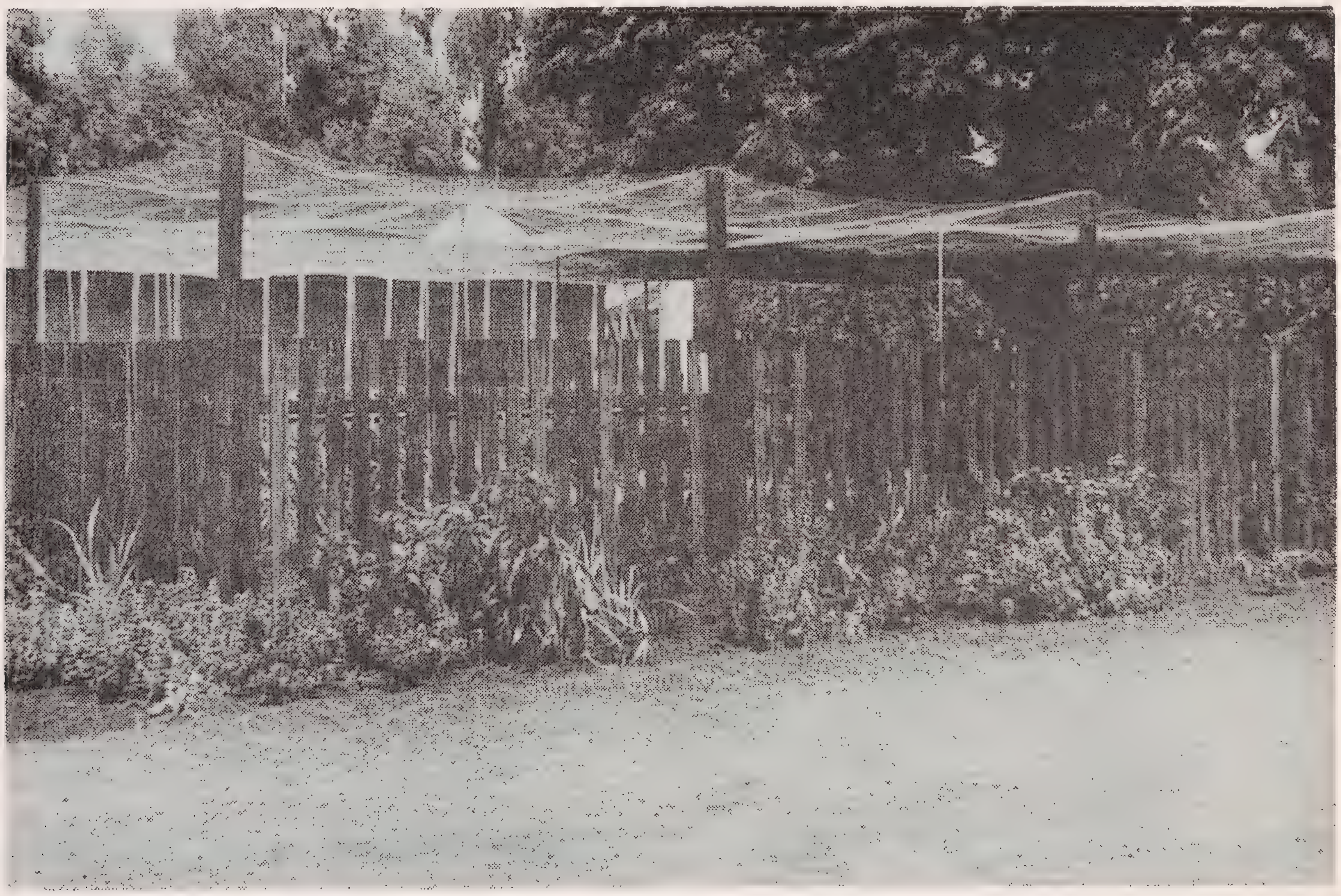

Fig. 20. *Amaryllis* display beds completely covered under fine mesh wire netting as permanent protection against hail.

The correct amount of fertilizer for a 44 gallon solution is measured off and dissolved in a bucket of water. The strong solution is then added to the water in the tank. A second hosepipe is attached to the bottom discharge pipe, the stop-cock opened and the beds irrigated in the normal manner. Whilst this is being done, the complementary tank is filled through another hosepipe attached to the water main. By the time the one tank has discharged its liquid fertilizer, the other is full and so the process is continued until all the beds have been watered and, in the process, fertilized.

To provide sufficient pressure (not much is required for an open 1 inch hosepipe), the tank is placed on top of another drum. These units are portable and can be handled by one man. Water is laid on along all the beds and standpipes with hose connections are provided at suitable intervals. The hosepipes are long enough to do quite a series of beds before the tanks have to be removed to new positions. This method of watering involves very little more time than direct watering from the pipelines and fertilizer is introduced to the bulbs simultaneously. These operations are carried out at fortnightly intervals throughout the growing season. Regular ordinary water, as and when required, is attended to in between.

Whilst on the subject of watering, here is some sound advice: Well established bulbs with fully developed root systems and healthy leaf growth can take a lot of watering. This, however, does not apply to newly planted bulbs. These should, during the establishing and developing stages, be kept reasonably moist at all times to stimulate growth, but please be very careful about over-watering because, at this stage, the possibility of rot is always present.

In the next issue of this publication I hope to give further information on the cultivation of Amaryllis in our part of the world. Meanwhile, letters from readers desirous of obtaining further specific information on activities at this end will be very welcome. Kleinskuur has a worldwide circle of friends and correspondents and we love receiving letters from them. In conclusion, I wish to thank my many friends I have made during my visit to the U. S. A. for their regular letters which are greatly appreciated.

## BOSHOFF-MOSTERT HYBRID AMARYLLIS

Mrs. B. E. Seale, *4036 Prescott, Dallas, Texas*

Amaryllis growers, enthusiasts and importers of *amaryllis* bulbs had the pleasure of meeting, entertaining and hearing the interesting and informative lectures of Mr. and Mrs. Leon Boshoff-Mostert from Balfour, South Africa, when they were on a tour of the United States in the Spring of 1960.

They lectured to Men's Garden Clubs, Women's Garden Clubs, Amaryllis Societies and groups of just plain lovers of flowers in many cities. We were especially fortunate in Dallas to have them as our guests for five days. They were presented to members of The Dallas Amaryllis Society and two hundred invited guests at the North-Wood Country Club for a Luncheon meeting, followed by a Lecture—Tea, in the afternoon. They spoke to The Men's Garden Club of Dallas, Dallas Iris Society and the Dallas Hemerocallis Society at their evening meetings.

The lectures were illustrated by many exotic color slides of the Amaryllis grown at Kleinskuur, Balfour, Transvaal, South Africa; and the pictures of their home and plantation of several thousand acres were beautiful.

In June 1960, I sent an order to South Africa for some of his Amaryllis bulbs. The carefully packed parcel of bulbs was received by me on September 8, 1960. To my surprise, most of the flower scapes were well advanced upon arrival. I potted them immediately and in about a week, one short scape with four beautiful blooms opened on one bulb. The other eight bulbs bloomed in rapid succession, except one bulb and it waited for almost a month before sending up two scapes; one scape had four blooms and the other one had three blooms. They were exquisite and the foliage grew right along with the blooms. Most all of the bulbs had two scapes with three and four blooms per scape; one bulb had three scapes.

The foliage that grew a little ahead of the bloom scapes was very beautiful. I kept the bulbs growing in the Garden-room of my home during the Winter months and we enjoyed the green foliage as Potted Plants. After danger of frost was over in the Spring of 1961, I planted them in the garden in partial shade under a large pecan tree. They grew in the garden all summer, until early October, when I took them up and stored them for three months.

In early January, I potted them and growth started immediately. First the foliage showed and by the time the scapes that followed were in bloom, there was sufficient foliage to make a beautiful potted plant, not just a bare *Amaryllis* bulb in a pot. I believe one of the most rewarding and outstanding things about these *Amaryllis* from South Africa is the growth of the foliage along with the bloom scapes.

It has been remarkable how these South African Amaryllis have adjusted to our northern hemisphere time of blooming. The extra months of growing time (13 months in all) were well spent, because they made a magnificent showing this Spring (1962). They are growing this Summer in ''The Amaryllis Circle'' in my garden. The size of the bulbs is increasing, (no shrinkage after blooming), and the foliage is very heavy. Some have small off-sets and all of the clones were good self-seeders and they crossed well, also.

This past spring I entered all of the South African Amaryllis in two Spring Flower Shows; some as Potted Plants and some as Specimens; each entry was awarded a Blue Ribbon and one, 'Kathleen Dobson' was given an Award of Merit for ''The Best of The Show'' in the Horticultural Division. In the same Shows, I entered 'Rose Queen,' 'Dido' and 'Zenith' (van Meeuwen hybrids) and they won Blue Ribbons also.

The following notations on the South African Amaryllis were made while they were in bloom in the Spring of 1962:—

'Cathedral Peak' is a blood red self, almost a purple hue; produced two scapes of four blooms each, about seven inches across the face (see Fig. 21).

'Eastern Glory' is a very dark mandarin red, with blood red influence; two scapes, four blooms each. Very striking in the sunshine with a glowing sheen; extra long and wide foliage.

'Kathleen Dobson' is a snow white with faint broken pencil lines of cardinal red on upper petals; frilled edges; two scapes with four blooms per scape and both were in bloom at the same time (see Fig. 21).

'Kismet' is a very large white, shaded with carmine veining; it has an iridescence or mother of pearl reflection in the blooms; produced two scapes with four blooms on each scape. It is a ''must'' in any Amaryllis grower's collection. The seed pods matured well.

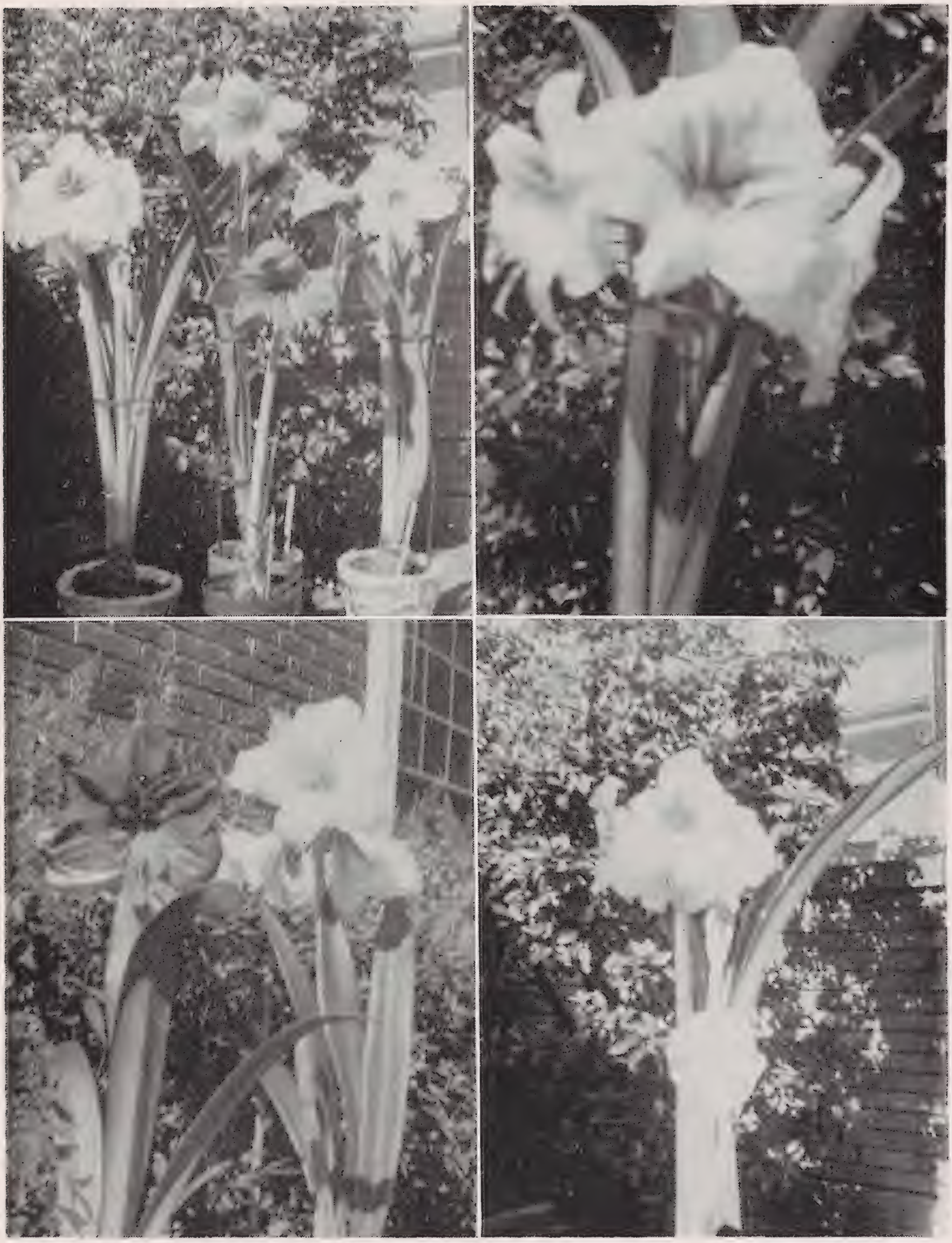

Fig. 21. Boshoff-Mostert South African hybrid Amaryllis clones as grown by Mrs. B. E. Seale (spring 1962), at Dallas, Texas.—Upper left, (left to right), 'Mandarin's Joy', 'Schooner', 'Cathedral Peak' and 'Magnolia'. Upper right, 'Kathleen Dobson'. Lower left, (left to right), 'Wisley' and 'White Belle'. Lower right, 'Dixie'.

'Mandarin's Joy' is a dark mandarin red self; very beautiful, with large round flat blooms; three scapes—two scapes had four blooms and one scape had three blooms; the scapes were extra long (see Fig. 21).

'Magnolia' is a large creamy white; green flushing toward the center; produced only one scape with four blooms; seed pod was very small (see Fig. 21).

'Schooner' is azalea pink, flushed white—has almost definite stripes; very large and decorative; it is a beautiful Amaryllis and had two scapes, with four blooms per scape; did not set seed (see Fig. 21).

'White Belle' is an exquisite, large (8-inch), flat faced, pure white Amaryllis; produced two scapes of four blooms per scape; good seed setter; foliage was luxuriant and is an exotic plant (see Fig. 21).

'Wisley' is a deep azalea pink; very large blooms of fine form and clear color; produced two scapes—one had three blooms and the other had two blooms; I am hoping that it will do better next year; I am giving it extra food for better growth (see Fig. 21).

Most all of these Amaryllis made large, full seed pods. As soon as the seed pods were mature. I planted them in one pound coffee cans. I have twenty cans with seedlings about four inches tall—they are growing in semi-shade and I can hardly wait to see how some of the crosses will result.

The one year old seedlings from the first blooms in September 1960 are very sturdy and strong in growth, with straps 14 to 18 inches in length. I am hoping to have excellent results from these since the Boshoff-Mostert Amaryllis are based on selections of the Buller strain given to him by Mr. Buller prior to 1952, and Mr. Boshoff-Mostert has apparently been improving his own strain since that time.

## EXPERIENCE WITH HYMENOCALLIS VELARDEI

JOSEPH D. SMITH, *California*

Two years ago bulbs of an *Hymenocallis* species were obtained from Dr. Vargas that he had collected in the Department of La Libertad, Province of Trujillo, locality Trujillo, Peru. The general appearance of these bulbs was quite a bit different from that of other *Hymenocallis* species. They were tear drop in shape and tapered into a long thin neck. They were about an inch and a half in diameter, and their thin blackish brown skins were a beautiful thing in the bulb line.

They were planted and when the foliage appeared it was tapered to an acute point. It arched over gracefully from a pseudostem much like the foliage of a Pamianthe. Bloom was anxiously awaited but did not occur until the beginning of the second growing season which followed a dormant period in which the foliage disappeared completely, as with the members of the Ismene group of *Hymenocallis*.

When the spathe valves had separated enough for the buds to be seen it was obvious that this was a new species of *Hymenocallis*. The striking thing noticeable at this stage was the extremely short tube and a very short pedicel. This arrangement places the flower in close to the umbel with only the ovary between the two parts. The length of the pedicel is 0.5 cm. and that of the tube 0.6 cm. Four flowers to the umbel have been noted as so far.

When the flowers opened more new features were observed. It was at once obvious that this was in the Elisena group due to the deflection of the cup. The over all flower color was a light greenish yellow. The stamens were 8 cm. long and straight. The cup was small, 1.5 cm. long by 1.5 cm. wide at the brim, with a tightly rolled lip, and the whole cup was so flattened that there remained very little space within. No odor was noted from the flowers. The petals extend well beyond the cup and are narrow and heavily undulated. They are characteristically curled as in *Hymenocallis longipetala.* The over all effect is quite odd and at the same time very attractive. This species could lend several new features to the hybrid *Hymenocallis.* It might be possible to intensify the greenish coloring, and to shorten the tube length of new hybrids.

This species has been named for Dr. Velarde, a Peruvian botanist instead of Dr. Cesar Vargas, its discoverer, because there is already a *Hymenocallis* named *vargasii* which was named for Dr. Vargas by Dr. Velarde. So it seemed only fair that Dr. Vargas' discovery should be named for his friend. More bulbs of this species have been promised from Peru. The original two bulbs now in their third growing season are starting their reversal of season from that of the southern hemisphere to ours and have started growth and flowered in August this year. By another season they should start in May and flower along with the other *Hymenocallis* of the subgenera Ismene and Elisena. Apparently it would be possible to maintain these bulbs on a fall flowering schedule with winter growth by lifting them in spring and replanting in fall each year thereby having two seasons of bloom each year—from different batches of bulbs of course.

## MOVING AMARYLLIS FROM ILLINOIS TO FLORIDA

Mrs. Fred Tebben, *Florida*

*Box 281, Lake Hamilton, Florida*

In November 1961, my husband and I moved our residence from Northern Illinois to Central Florida, and all my amaryllis were moved down here too. Some were moved in 1960 and were planted in a friend's yard where they carried on as best they could without any care at all. These were almost all seedlings, some having bloomed and proved to be most interesting, while others have never bloomed even though they are probably ten or more years old. Of this lot I think I lost a considerable number, but there are still over a hundred that I have moved from my friend's yard to a bed prepared for them in my own back yard. Next spring I shall hope for bloom from a great many of these and those not up to standard will be discarded and replaced with others.

A second lot of bulbs were moved to Florida in the spring of 1961, and these I had intended to plant on our own lots, but our builder was afraid they would be plowed up or plowed under before the lawn was completed, so he planted them for me in his own garden. I moved them home last November when we first arrived here. They were Howard & Smith, African, Australian, and unnamed Dutch bulbs, and I am afraid I lost quite a number of these too. I thought all one had to do was to put amaryllis bulbs in the ground and they grew here in Florida without much care, but I find there is one dreadful pest that cannot be ignored and must be watched for all the time. This is the huge ''lubber grasshopper'' that is referred to in the Nehrling report written so many years ago when Henry Nehrling lived here in Florida. These huge grasshoppers measure three and one-half inches in length, and the tender center leaves of the amaryllis are their favorite food. Indeed they can make short work of any and all amaryllis leaves, although the blooms are nearly all gone by the time these grasshoppers appear. They can be knocked off easily and killed with a stick. In fact that is the best way to deal with them for unless one dusts and sprays all the time the frequent rains wash off the insecticides and leave the grasshoppers a clean garden to feast on. It is best to plant the bulbs completely covered up to the neck. If any part of it is left exposed the grasshoppers will eat that too.

I had kept all my named Dutch bulbs in the pots they grew in up North and I did not bring them down here until we came last November. I removed them from the pots, shook all the dirt off and packed them carefully in a box with wood shavings between and around them to insulate them and keep them dry. These I did not plant out till late January, and while all lived, not all of them bloomed. Those that did bloom attracted a good deal of attention and received lots of admiring comment for not many Dutch bulbs are grown around here. These have done quite well so I hope for more bloom from them next February. I am fortunate to have quite good soil in this section of the Florida Ridge Country so have had good growth with only the addition of good bulb fertilizers. None of the nurseries or seedsmen know anything about mulches, and since all I could get would be peat, I have not used any mulch so far. The bulbs that were planted here last fall remained green all winter and withstood temperatures down to 28 degrees, without being damaged by the cold. They were not protected in any way. I have planted the named Dutch amaryllis in a bed protected from the cold north winds and shaded somewhat by a large oak tree, so I hope they will withstand the cold. I do not want to dig them each year unless it is absolutely necessary.

There is still much to be learned about growing amaryllis in Florida and I would certainly welcome advice and help from any who might be willing to help an amateur. Before closing this brief article which Dr. Traub has asked me to write, I thought you might be interested in hearing about the ''native'' amaryllis that grow in abundance hereabouts.

There seem to be four species that do remarkably well here in spite of the lubber grasshoppers. First, there is the *Amaryllis striata* var. *fulgida,* which blooms in March and seems to want to go to rest immediately after it has bloomed. This is the same old variety that used to be such a popular pot plant up north and did well when it was rested in the summer and grown in a sunny window in the winter. It has a deep orange (nasturtium red) bloom with the central greenish yellow star, slightly ruffled tepalsegs and flaring somewhat. It offsets rapidly and soon makes a fine clump of bulbs. The second I noticed is much like this one in color, but it has a less flaring bloom and has a round center spot of greenish yellow. At first I thought this smaller, daintier bloom must be *Amaryllis striata crocata,* but I am told that it is the true ''*Amaryllis belladonna* L.,'' found everywhere here in old dooryards and gardens. Then, too, there are many *A.* x *Johnsonii* bulbs which produce their lovely red flowers with the white lines, and grow to huge height with long strap leaves, but do not increase as rapidly by offset bulbs as the two first mentioned. The fourth species grown here I have been so far unable to identify. It may be a different *johnsonii,* although it is lighter in color, and a daintier bloom with its white lines radiating from the center of the flower. It increases much more rapidly than the taller ones and I have seen clumps of at least twenty bulbs with as many as fifteen scapes per clump. I am most anxious to know what this species may be but as yet have been unable to find anyone who can tell me.

There are many rows of ''Milk and Wine Lilies'' as they are called here, a *Crinum,* the true name of which I have so far not learned. There are also large clumps of a *Crinum* they call the ''Christopher Lily'' that I must also learn the proper name for as time goes on [either *C. giganteum* or a hybrid of it.—Editor] There are many *Eucharis* lilies grown in pots here for they do not do well unless they are confined and crowded in a pot. I have found this true also of the clivias. They can not be grown out of a pot. My *Amaryllis forgetii* is doing excellently down here but I shall not try to put it out in the soil for I am sure it would not survive the cold even here in Florida.

Perhaps after I have lived in this state longer I shall know all the correct names for the bulbs I have described above, but I have not found any gardeners really interested in the true names. They ''just grow them for their flowers.'' What's in a name anyway?

## GROWING AMARYLLIDS IN NORTH GEORGIA

BY BECKWITH D. SMITH, *3479 Rockhaven Circle, N. E.*
*Atlanta 5, Georgia*

My last contribution to Herbertia on growing Amaryllids is contained in the 1960 issue, at which time the article was headed ''Growing Amaryllids in North Florida''. When the article was written, I was living in Jacksonville, Florida, with no thought that I would ever be elsewhere. It will be noted from the above heading that I am now (in 1961) ''Growing Amaryllids in North Georgia'', more specifically, Atlanta, Georgia. My employers, the American Oil Company, moved us in September of 1960. We had the gargantuan task of digging my hybrids out of their Florida soil, packing and transporting in a trailer to our new location. We first settled at a location on Elmwood Drive, N. E., where the bulbs were duly planted after being spread out over a basement floor for more than a month. After the winter was over, we relocated to our present address, where the bulbs were again planted on a broad hillside in back of our new home. It was a surprise that any of the bulbs bloomed after the shock of being transplanted twice, but some of them did, regardless, while others blasted shortly after the bud tips emerged from the bulb tissue.

The clay soil in our present location contains little or no nourishment, other than iron, aluminum and some trace elements. So to provide the proper nourishments for the bulbs, each planting row was lined heavily with dairy fertilizer and further fortified with commercial 6-8-6, bone meal and liberal applications of Capco soluble fertilizer. Bulbs are responding well, although they seem to resent the full sun treatment, and are slower to grow. We are now in the process of mulching all planting rows with well rotted dairy fertilizer, and when leaves die down will further mulch with rotted sawdust. We know that North Georgia weather is cold, because last winter the temperature went down several times to 12 and 14 degrees in the Atlanta area, and there were two severe sleet and ice storms which left a blanket of ice on the ground for a week each time. This was at the location where the bulbs were first replanted, but fortunately all rows had been covered heavily with leaves, and somehow they carried through with but few freezing losses.

During the winter, indoors, trials were run on named clones of Ludwig, Van Meuuwen, Van Waveren and Warmenhoven Amaryllis which had been brought along in cellophane bags and repotted. Response was very good insofar as blooms were concerned, but scapes were shortened, no doubt due to having lain in the cool basement.

Trials have begun on hybrid *Amaryllis* raised by Mrs. J. S. Barry, of Route 1, Box 7, Prairieville, Louisiana. Mrs. Barry is hybridizing many Amaryllis from the major Dutch suppliers of named clones, and is meeting with great success in producing healthy, robust and hardy bulbs from crosses which she has made. Red, pink and white seedlings were furnished the writer the early part of the year, and bulbs forced inside produced remarkably beautiful flowers. Mrs. Barry is also producing many seedlings from named clones and from her own hybrids. We will continue trials on these bulbs this winter and hope to have some interesting material to report in a future issue of Herbertia. Meantime, we will expect a profusion of blooms from our own bulbs growing here in Atlanta next spring, and since the bulbs should have become better acclimated by that time, excellent color pictures should result. Now that we are in Georgia for what seems a number of years, we hope ultimately to meet all of the hybridizers and growers in the state. We have found that strains of Dutch *Amaryllis* do well for us out of doors in Georgia. We hope more Georgians will grow them.

[Mr. Smith's 1961 article above was received too late for inclusion in the 1962 issue and had to be held over to this 1963 edition. See also Mr. Smith's 1962 article which appears under the Genetics and Breeding heading earlier in this issue.—*Editor*]

# NOTES ON THE BLUE AMARYLLIS

### Mrs. Adda Abendroth

In July 1961 I sent seven bulbs of the Blue Amaryllis to Sr. H. J. Eipper, Corupá, Sta. Catarina. On June 14, 1962 he sent me a kodachrome of *Worsleya rayneri* in flower. In his letter of Feb. 1, 62, Sr. Eipper wrote that 2 of his bulbs had flowers, one 3 and the other 4, of the loveliest lavender blue. On July 8th he wrote that all except the smallest of the 7 bulbs had flowered, the last one to bloom being the one on the picture he sent, with 5 individual flowers, some time late in April. In its native habitat on mountain cliffs around the town of Petrópolis *Worsleya* blooms late in January, as far as I can tell from sporadic trips to that town.

Petrópolis is situated at about 700 meters above sea level in the coastal mountain range along the Atlantic, an hour and a half bus ride from Rio. The only spot I have seen *Worsleya* growing wild is on the rocky slope facing east back of Orquidario Binot in the suburb Retiro. The rock rises abruptly to over 100 meters. Using binoculars I could make out large clusters of curved leaves and lavender-pink flowers nestling in crevices along transverse folds and steps of the rock among weeds and some shrubbery. Incidentally, a forest fire late last year destroyed all vegetation on that slope. In December the decline was quite naked and the crosswise folds were brown. On a visit to Binot on January 30th 1962, however, I could detect some green here and there with my glasses. Despite the overcast sky I also saw, I believe, an occasional patch of lavender. Only on a sunny morning would flowers there be plainly visible.

In Petrópolis, and also in our town, several Worsleyas grow in private gardens. Friends in Petrópolis tell me the plant is at home high up on mountains in their vicinity, and that once in a while bulbs are brought to the public market for sale. My friend's son said he knew where the plants grow not very far from their home in the outskirts of town. Attempts to persuade the young man to take me there failed, but during the July holidays he obligingly undertook a hike to the place and brought back as many plants as he and a helper could carry. They were huge, vigorous specimens. Part of them were then shipped to Corupá in the State of Santa Catarina, where they appear to be doing fine. Two isolated bulbs of the lot that are being cultivated in Teresópolis don't look happy and have not flowered in season.

Florists in Petrópolis know the lavender-flowered Amaryllis, but put no store by it "because it does not thrive in cultivation" they say. According to late Dr. Hoehne, (S. Paulo), however, a couple of bulbs imported in 1932 adapted well in the gardens of the Instituto de Botânica where they flower regularly. On March 5th 1952 Dr. Hoehne wrote me: "Our Worsleya bulbs have flowered time and again and just now a large specimen growing on a rock in front of the glass house has a stalk with eight flowers. The plant takes an inclined position and the inflorescence protrudes almost horizontally while the leaves curve like the feathers in a portly rooster's tail.''

The curved shape of the leaves inspired one of the popular names of the plant down here: ''rabo-de-galo'', meaning ''cock's tail''. (Hoehne in ''As Plantas Ornamentais da Flora Brasilica, S. Paulo 1936). Pio Correa (Diccionario das Plantas Uteis do Brasil e das Exôticas Cultivadas, Vol. I) registers *Worsleya rayneri* syn.—Hippeastrum procerum under ''Açucena'' and ''Flor da Imperatriz''. Petrópolis being the summer resort of the Imperial family up to 1888, it may well be that this outstanding flower captivated the fancy of the Empress Theresa Christina, an Austrian princess, and that the inhabiants named it in her honor. Açucena is the popular name given to any Amaryllis-like flower here and in Portugal. Nowadays the name most used is ''amarilis-de-flôr-azulada''. Occasionally flowers are offered for sale in Rio Flower Market.

Hoehne thought ''plenty of sunlight and altitude and lots of breeze seem to be the ingredients that bestow such exquisite loveliness on the large blue flowers, and that may be why cultivation in hot houses in Europe has met little success.'' (Plantas Ornamentais).

Worsleya is practically unknown in Teresópolis. Neither its looks nor its various names strike a familiar note among the country people and hunters and plant collectors. Carlos Toledo Rizzini does not include it in his Flora Organensis (Rio, 1954).

*Theresópolis, Brasil,*
July 20, 1962

## AMARYLLID CULTURE IN MARYLAND

WILLIAM W. ZORBACH, *Maryland*

The writer resides in a suburb removed 11 miles north of downtown Washington, D. C. A prime consideration in the outdoor culture of amaryllids in this area is the nature of the soil, especially in the newer developments where the contractors have been careful to remove completely any top soil as did exist, or to bury same. Thus, most homeowners must contend with either hardpan or heavy clay or a combination of both. The writer recommends strongly the following procedure which he adopted late in 1959 when he moved into his present location.

Along the south wall of the house he removed completely the clay soil from a section 20′x3′x1′ in depth, save for about 3 inches from the top which was returned to the trench to impart substance. Along with this was added 2 bales of sphagnum peat moss, 20 small disposal cans of thoroughly decayed oak leaf compost to which ground limestone had been added, 25 pounds of Bovung, 10 pounds of bonemeal, and finally one ton of sand. The soil mix was turned over repeatedly until thorough mixing was effected, and it was then tamped by foot. The bed is, fortunately, slightly elevated with respect to the yard, and the drainage is absolute. Owing to the fact that the yard is in full sun, a lath shade 5′ high was constructed over the bed. Plantings in the bed have been in general most successful, and the writer has been using it in particular as an experimental bed for wintering over various genera, inasmuch as the location is well protected in the winter.

A young bulb of *Crinum powelli album* was obtained in 1957 and was grown at the writer's former residence under unsatisfactory conditions without success. It was replanted in the late fall of 1959 in the newly prepared bed but during 1960 made leaf growth only. In 1961 the bulb divided, making several small offsets; leaf growth was excellent. In June 1962, the main bulb bloomed for the first time in five years and threw up four scapes in rapid succession (this was well worth waiting for!). Excellent bulbs of *C.* 'Cecil Houdyshel' and *C.* 'Ellen Bosanquet' were obtained from Wyndham Hayward in the fall of 1960 and were planted immediately. Each was covered with 6-8 inches of soil as measured from the neck of the bulb. Leaf growth began in the spring of 1961 as soon as the freezing weather was over. *C.* 'Ellen Bosanquet' appears to be somewhat more tender and is slower in starting. Both bloomed during the summer of 1961 and did even better during the present summer (1962). 'Cecil Houdyshel' produced 5 scapes, each 4½-5′ high, whereas "Ellen Bosanquet" came through with 4 scapes, not so tall as the former.

In a row along the front of the bed are planted some 35 *Rhodophiala bifida.* They are perfectly hardy in this location and even with the severe winter here in 1960-61 made excellent bloom in late August of the following summer. As this is being written (September 1962) they are again in bloom but have been doing so more or less sporadically. A likely reason for this is the fact that this past August has been the driest one in Washington weather history with only 0.055 inches of rain recorded. In Kensington 0.000 inches fell. Recently a little rain has fallen and the *R. bifida* have been doing somewhat better.

Six bulbs of *Brunsvigia rosea* (Cape Belladonna) were obtained from a seed company in 1958. The bulbs were planted at his former location without success, and along with the other amaryllids were dug and replanted at the present location in the fall of 1959. The leaves in cross section have the shape of a flattened "V", and tend to emerge in the late winter during warming spells. This is unfortunate because freezing weather invariably sets in again and kills "down" the emergent leaves. As spring advances the bulbs make leaf growth once more but the leaf growth is anything but luxurious, with the straps attaining a length of around one foot. Such was the case in 1959-60 and in 1960-61; consequently no scapes appeared. The last winter (1961-62) was quite mild, however, and spring came earlier. Leaf growth appeared early but was not set back, and the bulbs made excellent growth until early June when they went into dormancy. This August the writer was rewarded with 4 scapes, red-brown in color and about 30″ in height.

Each produced on the average ten orchid-colored trumpets, rather similar in appearance to *Lycoris squamigera.* In contrast to the latter which has an unpleasant oder and a rough texture, the subject flowers were smooth and had a delicate lemon odor (the editor's comments here are welcome). Other Amaryllidaceae which have been handled successfully as hardy bulbs here are: *Habranthus brachyandrus* and *H. robustus, Sternbergia lutea* and various *Zephyranthes.*

Of especial interest in the recent Amaryllis Year Book was Sam Caldwell's delightful article on *Lycoris.* Indeed, Mr. Caldwell's request for information on *Lycoris* from other "nuts" was chiefly responsible for this article, and he will no doubt be heartened by the information that the writer enjoyed a similar "success" with *L. traubii.* In the fall of 1960, six bulbs were obtained from Wyndham Hayward; four of these bloomed shortly after being planted. Leaf growth appeared but the cold weather which followed stunted the leaves. No blooms appeared in 1961 but during the fall of that year, leaves again pushed up. This time, the growth was even poorer than before with the result that no blooms were obtained. It is clear that the winter weather in this area is too severe for this species. Perhaps a cold frame would be the answer? *L. squamigera* offers no problem here, but in view of the desert-like conditions here in August, only five scapes appeared in spite of what might be considered heavy watering. It is my impression that *Lycoris* does best during periods with adequate rain. In this respect the writer cannot help but recall a letter of two years ago from Wyndham Hayward who remarked at how the hurricane rains in Florida that year had brought up the scapes of his *Lycoris* in abundance. *L. albiflora* are perfectly hardy here and are now in bloom.

The writer obtained a single bulb of *L. caldwellii* from Wyndham Hayward in the fall of 1960 and planted it five inches deep. Nothing happened and when the first of the year arrived the prognosis was indeed poor. December had been extremely severe and January was even worse. The weather was very cold and on one occasion, 16 inches of snow fell in the yard. Occasionally, a sunny, somewhat warmer day would appear and the writer would take advantage of this to remove the snow from the bed by hand especially for the sake of the *Rhodophiala* which is making growth at this time. On one such day late in January, the writer was greeted by an extraordinary sight. At a position where *L. caldwellii* had been planted a cluster of straps projecting about one inch from the soil surface showed. These maintained steady growth during the cold weather which persisted through March and the leaves appeared to be completely unaffected by the cold. Growth continued until late June, the bulb going into dormancy somewhat later than did *L. squamigera.* In mid-September of last year (1961) the writer was rewarded with a scape some two feet high. The flowers, on opening, were a pale yellow but after a day or two changed to near-white. This is truly a beautiful *Lycoris.* Leaf growth began around the first of February (1961) and showed that the bulb had divided. Two scapes appeared recently, confirming this observation.

Approximately one dozen *L. radiata* (red) were transplanted in 1959 but were placed in an ordinary and not so well protected location in soil consisting chiefly of clay, with some sand added. The bulbs did absolutely nothing for one year and it was decided that they had rotted. In November of 1961, leaves miraculously pushed up and reasonably good growth was made during the winter of 1961-62. Four scapes have pushed up to date; the failure of the others might be due, conceivably, to the dry conditions here this year. The writer's experience with the latter *Lycoris* certainly supports the contention that *Lycoris* takes a long time in becoming established.

In addition to wintering over hardy amaryllids, the subject bed is also employed for several tender genera. *Haemanthus multiflorus* blooms and grows well under the lath; in general this is found to be more satisfactory than growing them in pots. They are remarkably resistant to cold weather and one year one of the larger bulbs did not rest off until mid-December. Prior to this time there had been some hard frosts and even a few sub-freezing nights. The leaves were only slightly affected and the bulb, which was covered with about one-half inch of soil, was in perfect condition when dug. Obviously this is applicable only to bulbs making full growth. Last year the writer was careless and delayed for about two weeks in digging them after the leaves turned yellow. By this time some rot had already set in, but by removing the rot and treating with an antifungal agent, he was able to salvage most of his stock which this year is somewhat diminutive.

*Sprekelia formosissima* grows well here and the bulbs are dug after the first frost. Considerable difficulty has been encountered in obtaining satisfactory blooms in the spring, and the explanation for this is that the bulbs, especially the larger ones, tend to sprout in storage before the weather attenuates enough to permit their planting. Even if they are planted early enough, the buds tend to "blast" under the soil or rot altogether, and it is becoming increasingly apparent that *Sprekelia* handled as tender bulbs require warm soil for root growth to start. Perhaps one should handle those bulbs which show evidence of early bloom in pots in the house, and after blooming they could easily be transplanted to the open soil.

A single bulb of *Amaryllis immaculata* was obtained and was planted outside. It has made excellent leaf growth but has not bloomed to date. *Cyrthanthus sanguineus,* which are carried over indooors in a planter, are transplanted to the bed outdoors. They make good growth here and bloom in the early fall.

Finally a word about one of the amaryllid enthusiast's most trusted friends—*Hymenocallis narcissiflora.* Five years ago the writer started with 18 bulbs; he now has around 80 most of which are blooming size. In addition there have been produced some 100 small offsets which were given to friends. The *Hymenocallis* are not grown in the "amaryllid bed" but along the east wall of the house in light clay to which much sand and some peat moss have been added. They grow very well here as tender bulbs giving excellent bloom in late June some

14-20 days after they are planted. As with *Sprekelia,* they are dug after the first hard frost and are stored, as suggested, in a warm basement.

In conclusion, the writer strongly recommends his procedure for soil preparation for growing amaryllids outdoor in this area. Admittedly it is a great deal of work to accomplish initially, but in the end will save in time and minimize failures. Not only does the soil thus prepared make amaryllid culture practicable, but serves admirably for growing other plants of a tropical nature, such as *Gloriosa* and *Achimenes.*

## ACCELERATED INCREASE OF AMARYLLIDS

L. S. HANNIBAL

The normal development of offsets in amaryllids can be accelerated by a number of simple horticultural techniques. The best known way has been employed by daffodil growers for fifty years or more, namely planting the bulbs quite shallow in a rich clay loam. This practice is particularly conducive to rapid bulb division or even splitting. The converse, deep planting, reduces offset development, but encourages large sized bulbs with blossoms suitable for the show bench. The writer has found that the same practices can be applied to many other bulbs, and that heavy fertilization in combination with shallow planting is particularly effective.

Secondly, we have the bulb cuttage technique where the bulb can be simply split with a knife or cut up into a number of pie like sections. Each has its merit. A bulb split at right angles vertically to the leaf axis without disturbing the roots will soon form two full sized bulbs. In contrast those cut up like a pie form a number of leaf axis bulblets along the leaf scale base adjacent to the basal plate. But since the segments from the original bulb have had the growth center split up or cut away, and since the roots are often lost, the rate of growth of the leaf axis bulblets is not as rapid as is normal for offsets. The growth rate is more comparable to that of seedling bulbs. This delay factor represents quite a disadvantage.

It was more by chance that the writer learned how to circumvent these delays. Leaf axil bulblets can be grown as rapidly as offsets. While digging some *Crinum* bulbs several had their basal plates partially torn loose. The bulbs were thrown into a leafy litter under an oak tree and forgotten. The following spring several clumps of eight to ten offsets were noted. Investigation showed that the intact portion of the basal plate had re-rooted and that scores of leaf axis bulblets had formed along the margins of the bulb scales where they had torn free from the basal plate. Some bulblets were growing up through the bulbs like normal offsets, others had reversed and were growing out direct from the face of the bulb scales where cut or torn.

Later experiments indicate that in early growing season cutting or notching away a portion of the bulb base would always produce axial bulblets along the margins of the cut leaf bases, and that this was particularly true if the bulb is planted shallowly or laid on the side. The best results were obtained when the cut area was kept above the ground level, but under a ground cover. In no instance should the growth center of the bulb be disturbed since the vigor of this portion of the plant is needed to accelerate the leaf axial offsets. Several notching patterns have been tried like those used on hyacinths but the preferred method appears to be a 30 degree pie shaped notch extending into the basal plate and lower leaf scale area about one-fifth the diameter of the bulb. Four or five notches can be cut in a single bulb without disturbing too many roots or the growing center. If planted shallowly each notch will yield from two to five leaf axis bulblets and often the notched pieces will yield an offset or two. The technique has been employed on *Crinum* without digging the bulbs with particularly gratifying results.

Plants like *Clivia* or *Haemanthus* can have the individual leaf margins notched to a depth of one eighth inch at the point of attachment to the basal plate or root stem. Bulblets will usually form in the cut margins in a matter of weeks. These should be left intact until roots have formed.

Another means of offset production was noted while experimenting with the sprouting of seeds and small bulblets with colchicine and acenaphthene. These mutagens cause an excessive number of bud sports to form in both the leaf axials and margins. These bud sport offsets are often tetraploid in character like the treated parent.

## MORE ON LYCORIS IN NEBRASKA

Vivian Barnica Grapes

My garden is in western Nebraska about eight miles from the northeast corner of Colorado, an elevation of 3369 feet. We have cold winters with lots of freezing weather from November until April, and usually several days of sub-zero weather in January, the average lowest 20 degrees below zero.

My planting of *Lycoris* growing under the sheltering branches of a large cottonwood tree includes: *L. squamigera; L. incarnata; L. haywardii; L. sprengeri; L. sanguinea; L. caldwellii;* the one sold as *L. ''cinnabarina''; L. houdyshelii; L. traubii; L. aurea; L. albiflora;* the one sold as ''L. albiflora carnea'' and some selections of *L. radiata.* I hope to add, for testing in Nebraska, bulbs of the later *Lycoris* discoveries as soon as they are available.

*Lycoris squamigera* opens the blooming season each fall around August 10. *L. ''cinnabarina''* bloomed August 18, 1961, after two years in my garden. *L. sanguinea* blooms regularly each season around August 22. *L. haywardii* August 23—this one is irregular in blooming for me. *L. incarnata* is usually in full bloom by August 28. *L. caldwellii* bloomed for the first time September 11, 1960 after two years in the garden. The foliage of *L. squamigera, L. incarnata* and *L. caldwellii* appears around March 18th and the foliage of *L. haywardii* and *L. sanguinea* about two weeks later. The bulbs of all are planted four inches deep to the base of the bulb.

So far none of the *Lycoris* in Subgenus 2 have bloomed here after wintering in the garden, but the bulbs live over, some show increase and the foliage seems to be coming stronger on several this fall (1961) so I hope they are getting acclimated and will bloom later.

*Crinum bulbispermum* and *C.* 'Cecil Houdyshel' have been growing in the open since 1957 and they bloom each summer, *Galtonia candicans* planted at the same time, and *Arum italicum* in my garden since 1941, also bloom and set seeds. The Crinums and *Galtonia* lose their foliage in the fall and new foliage comes up in late spring, but the lovely foliage of *Arum italicum* appears in October and lasts through the winter and does not die away until after the blooming season.

The soil in this part of the garden is a sandy loam underlaid with gravel and has perfect drainage. I cover the bulbs each winter with three to four inches of wheat straw, I find that a heavier covering causes soft growth on the lycoris foliage which is more subject to freeze injury.

My grateful thanks are due to Mr. Hayward, Mr. Morrison and Dr. Traub for making it possible for me to grow some of the newer *Lycoris* species.

## ARTIFICIAL LIGHT FOR AMARYLLIS CULTURE

RICHARD J. SUDD, *Illinois*

During the summer of 1960 my patience with the elements here in Northern Illinois was just about exhausted. Being able to have control over the wind, light, watering, etc., prompted my experimenting with the growth of *Amaryllis* under artificial light, in complete absence of sunlight. With the available space and electricity being one of the cheapest services in our area, I commenced my experiment.

In the past ten years I have been able to collect some hundred hybrids and species. This size collection made it impossible for me to grow all the bulbs under artificial light, but with those *Amaryllis* growing under artificial light the experiences and the knowledge obtained has been both enlightening and rewarding. Before I mention my experiences I think it would be worth while to give a picture of the environment and lighting arrangement.

All the *Amaryllis* species and hybrids are grown in the basement of our home, which is below ground level, and there the temperature range very seldom falls below 65 degrees F. in winter and above 75 degrees F. in summer. Even with the prolonged below zero weather during the winter of 1961-1962 the temperature seldom fell below 65 degrees, even when heat was not supplied. When heat was supplied, by a forced air heat plant, a temperature of 70 degrees with a humidity of 60% was maintained, if possible. During the summer months there is a rise in temperature and humidity, but with the added circulation of outside air, this was found to be beneficial. In the winter the forced air circulated by the heating plant was sufficient for ventilation.

The choice of fixtures is a matter of preference and in my case industrial fluorescent fixtures were used because of easy handling. I obtained three fixtures with porcelain coated reflectors approximately twelve inches in width and each containing two forty watt fluorescent tubes (cool white). Having a little knowledge of electricity, I connected the three fixtures parallel on a fifteen amp line, which was added for this specific purpose. On the line the fixtures were connected to an outlet which was controlled by a switch and automatic timer. With the automatic timer the light source can be limited to any number of hours and at present I have limited this to fifteen hours for *Amaryllis* growth.

All three fixtures are suspended from the ceiling by dog chains. above a platform four feet by seven feet. The fixtures are arranged parallel to each other with a space of twelve inches between the reflectors. Arriving at the proper height of the fixtures was governed by the light energy measured in foot-candles, from the fixtures to the platform. Depending upon the type of fluorescent tubes and reflectors used, there will be a variation in illumination.

On the market to-day are a number of fluorescent tubes under which *Amaryllis* will grow. They contain blue, red, green and yellow parts of the visible color spectrum and for plant growth it is best to strive for a balanced lighting. For balanced lighting, obtaining the highest quantities of the blue and red visible color parts of the spectrum will give the best plant growth, as it is the blue and red rays that the plant utilizes for vegetative and bud formation. At the start of my experiment with artificial light, trying to achieve a balance of red and blue rays brought about the use of incandescent light bulbs and various types of fluorescent tubes. The incandescent bulb is a good source of red rays, but its use is hampered by the heat energy, which will burn foliage that comes in contact with it. Approximately eighty per cent of the energy of the incandescent bulb is heat whereas in the fluorescent tube only twenty per cent of the energy emitted is heat and this amount has no effect on *Amaryllis* foliage. Also it will be noticed that the fluorescent tube has an abundance of blue rays and sufficient red rays, so for a practical source of artificial light the fluorescent tube is adequate.

Any type of fluorescent tube may be used, but in my case I have found the best results are obtained with the use of the cool white fluorescent tube. This type of tube was used primarily for its brightness and to obtain an illumination reading of 200 foot-candles at the greatest distance between the *Amaryllis* bulb and the fluorescent tube. Using a light meter it will be found that a 200 foot-candle reading will fall approximately twelve inches beneath the fluorescent tube. All *Amaryllis* bulbs vary in size and to allow for the various sizes in the containers being used, an added twelve inches was needed to maintain the vegetative growth within the 200 foot-candle illumination. If the *Amaryllis* bulb had to be raised to maintain the vegetative growth within the 200 foot-candle illumination, empty flower pots were used. This method eliminated the raising and lowering of the fluorescent fixtures and the two feet spacing between the plant platform and fixtures I have found to be adequate.

The life of the fluorescent tubes used varied and to utilize the greatest efficiency of the tubes, I have replaced old tubes every six month period. As the fluorescent tubes become older there is a considerable drop off in illumination. If the *Amaryllis* is receiving sufficient illumination the leaves at the neck of the bulb take on a dark lavender appearance and the remainder of the leaves become a dark green.

As mentioned previously the fluorescent fixtures were placed parallel to each other with a twelve inch spacing between the reflectors to help control the bending of the vegetative growth (phototropism). At present the position of the fixtures has worked satisfactorily, especially when the *Amaryllis* are in a budding stage. The *Amaryllis* is allowed to continue its growth and bud development directly beneath the fixture until the scape has reached the fluorescent tube. At this stage the *Amaryllis* bulb is placed between the fixtures with the leaves beneath the light and the scape continuing to develop between the fixtures. If the *Amaryllis* in bud is placed between the fixtures before the developing scape has reached the fluorescent tube there will be a considerable bending of the scape towards the greatest source of light energy. If the bulb has not developed a strong root system the bulb will not support the weight of the scape and flowers. Continued development of the scape above the fixtures was normal and bending of the scape ceased to a large degree. About the only bending of the scape will be caused by the reflected light from the surrounding area.

The flower development above the fixture was also normal. There was no noticeable change in the flower color or texture, but the lasting qualities of the flower seem to be prolonged more than those *Amaryllis* grown under outdoor conditions.

The growth of seedlings under artificial light with sufficient illumination shows great promise of bringing seeds into bloom within a two year period. During the winter of 1961 a few seeds from crosses among the Striata Group were planted and leggy or weak growth was not apparent under sufficient illumination. I was even surprised to see offsets produced after six months growth.

At the end of this year's flowering and growth, all fluorescent tubes I now have, are going to be replaced with a fluorescent tube made especially for plant growth. This tube is available under the trade name ''Gro-Lux.'' (GRO-LUX is manufactured by Sylvania Electric Products, Inc., Salem, Mass.) It contains the blue and red rays, which cast a lavender glow and this is the closest to a balanced lighting yet available. From all reports plants growing under ''Gro-Lux'' are superior to those grown under other sources of light energy. What effect this new source of light energy will have on *Amaryllis* growth, I hope to discuss at a later date.

For those individuals who wish to experiment with *Amaryllis* growth or other forms of plant life under artificial light, there are many articles that have been written and which are available to the public. The U. S. Department of Agriculture, Agricultural Research Service has available many articles on the subject of light effect on seed germination, plant growth and plant development. I would like to recommend one article (Publication No. 879) available from the U. S. Government Printing

Office, Superintendent of Documents, Washington 25, D. C. This article titled ''Light and Plants'' gives general information and a series of experiments demonstrating light effects on plant life.

# WINTERING AMARYLLIS IN THE NEW ORLEANS AREA

W. J. PERRIN, *Louisiana*

This article has to do with the average home garden and not the commercial grower planting large plots. The record breaking freeze of January 10, 11, 12, 1962 in which we experienced a low of 10 degrees, may not happen in years to come; however, the safe way is to plan and be prepared for the worst at all times. Much bad publicity was given *Amaryllis* immediately after this severe freeze. Some would have you believe *Amaryllis* cannot stand a three day freeze in this area. The Men's Amaryllis Club of New Orleans Show, staged April 7th and 8th, in which an abundant number of flowers were shown, best proves that *Amaryllis* is well capable of taking care of itself in cold weather.

Those planting *Amaryllis* in this area should keep three things in mind: 1. Drainage; 2. Mulch; and 3. Location and Exposure.

Drainage and mulch are a must for without these the normal winter will damage bulbs. Location and exposure, not much heard of until the late freeze, now becomes No. 1 in importance. It has been proved that *Amaryllis* will not take the strong north icy winds blowing in their ''face.''

Figures 22 and 23 show the effects of proper back wall protection and exposure. We see no damage whatever in Fig. 22, upper left and right. The back stucco wall and large roof overhang with westerly exposure giving full protection. Fig. 22 lower left, with direct north exposure results in total loss. Partial damage will occur where exposed to the north wind, however small, as in Fig. 22, lower right. A highly elevated, well mulched bed is seen in Fig. 23 left. This bed, totally exposed, suffered heavy damage. Back wall protection is exemplified in Fig. 23, right. The south wall of garage gave 100% protection.

Many will say, ''Conditions are such in my yard I cannot protect from the north winds.'' In such cases it is very convenient to dig and store the bulbs during the winter months. This is an old practice which has been going on for years by many hobbyists. About November 1st, or before danger of freeze, dig all bulbs, wash and cut old foliage. Disinfect and let bulbs dry about one week, then place bulbs in pasteboard cartons. Fill cartons to a depth of ½ to 1 inch with horticultural Perlite, lay bulbs on Perlite, then cover with Perlite. Bulbs may be stored easily and kept in good condition. The cartons must then be kept in some protected location where temperatures will range from 50 to 60 degrees. March 1st, or after danger of frost, bulbs are again planted. You will experience normal bloom. The bulbs will root well and you will find the rest did them good. There is another advantage in this. We all know *Amaryllis* are heavy feeders. By stripping the beds we have an excellent opportunity to work the soil and add missing ingredients during winter months.

Potted *Amaryllis* stored for winter rest should be placed in locations where temperatures will not go below freezing—80 Dutch bulbs were stored in closed garage. All bulbs froze. No heat was provided.

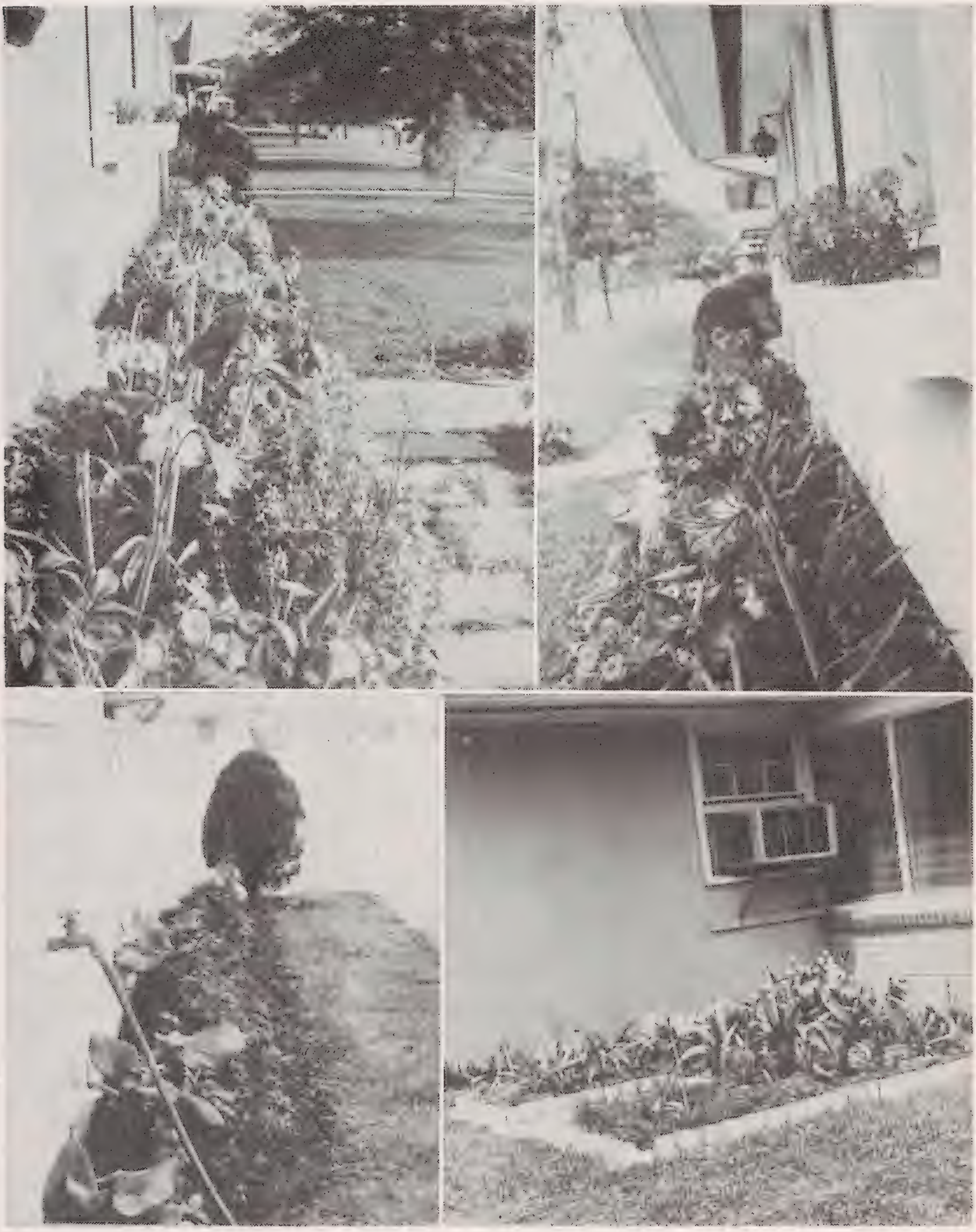

Fig. 22. Effects of January 1962 freeze on Amaryllis, New Orleans Area—upper left & right, no frost damage. Lower left, north exposure, total loss. Lower right, partial damage. See text for further explanation. Photos by W. J. Perrin.

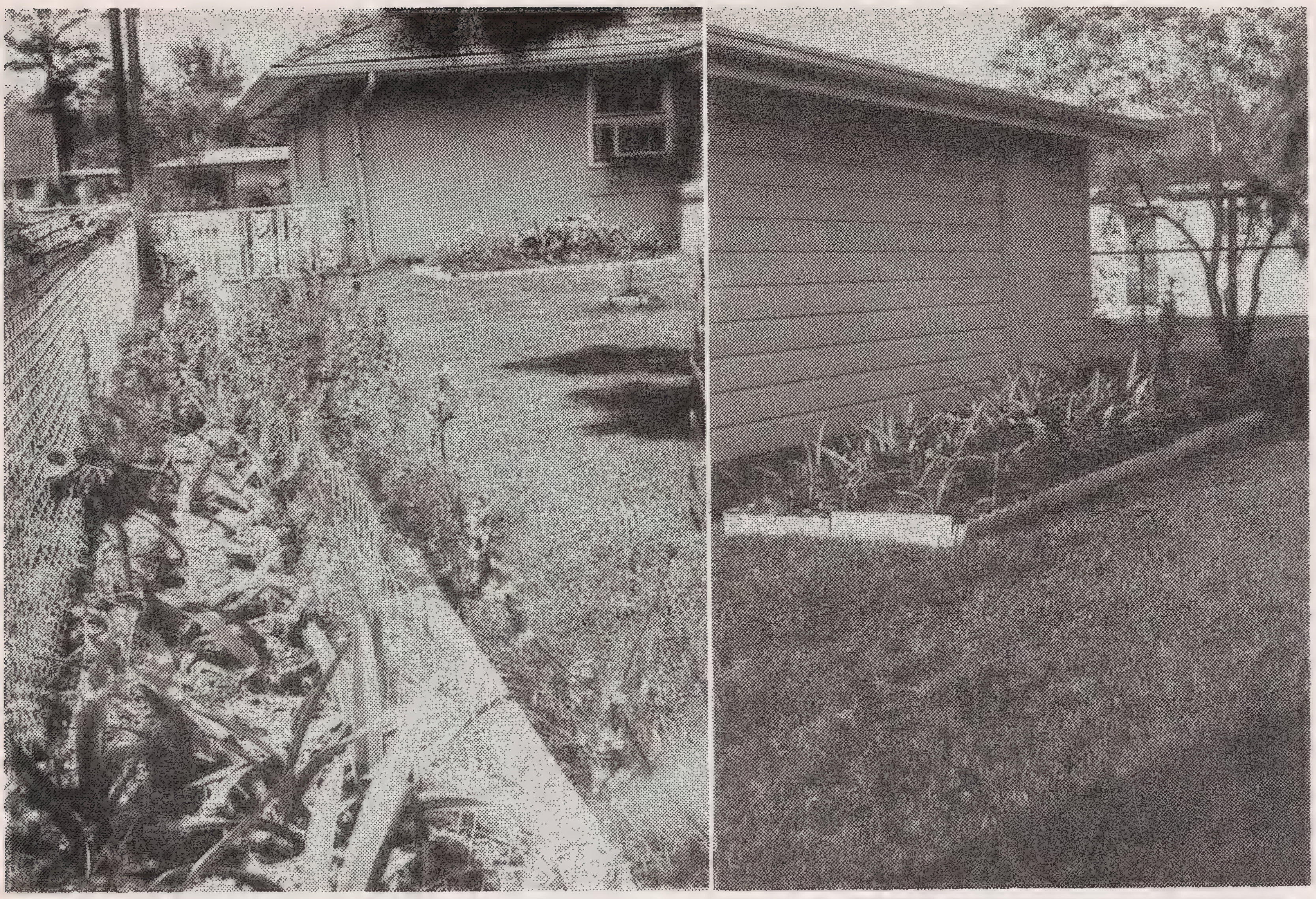

Fig. 23. Effects of January 1962 freeze on Amaryllis, New Orleans Area—Left, well-mulched highly elevated bed fully exposed suffered heavy damage. Right, south wall of garage gave full protection and no damage was suffered. See text for further explanation. Photos by W. J. Perrin.

# WINTERING AMARYLLIS IN OPEN GROUND

WALTER R. LATAPIE, *New Orleans, Louisiana*

Most of our Dutch and American hybrid *Amaryllis* survived the three-day severe cold spell last winter, when the temperature went as low as 10° F., on January 10, 11, and 12, 1962.

Some of the beds that were saved had been mulched during the summer with sugar-cane bagasse and then in December a 6-inch layer of pine needles was scattered over the ground. However, there was one bed with only the bagasse mulch, where none of the bulbs suffered any damage, but this was in a Southern exposure.

The bulbs that were lost had been planted on the Northern side of the house, with only a little of the bagasse mulch left around them.

From my observation of other gardens throughout the city, the deeper the *Amaryllis* bulbs were planted, the better chance they had to survive the severe cold when no mulch was used.

Mulching *Amaryllis* beds is very helpful in New Orleans. In the summer it cuts down on the need for weeding, and it conserves moisture. In the winter it protects the bulbs against frost and cold.

Regarding other Amaryllids planted in the open ground, the following Crinums survived the 10° F.: 'Cecil Houdyshel,' 'Ellen Bosanquet,' *moorei,* and *americanum.* The cold did not affect the *Zephyranthes* and *Sprekelia.* Last Spring I planted some *Haemanthus multiflorus* about 2 inches deep. During the winter these bulbs had sunk down about 6 inches into the soil, which is probably why they survived. They sprouted during the month of May.

## LESSONS FROM THE 1962 FREEZE

EDWARD F. AUTHEMENT, *Louisiana*

*Amaryllis* fanciers of the Gulf Coast area were caught in a record freeze in January 1962 which will be remembered for quite a long time. Our customary mild winter weather in New Orleans was far from mild. When the forecasters predicted temperatures down to 12 and 13 degrees F., there was skepticism because such low temperatures were unheard of except in weather records of 100 years ago. It is good news then that so many plants were saved in spite of these low temperatures. There is no doubt that if the freeze had continued 2 or 3 days longer, the damage to vegetation in this area would have been tripled.

In the New Orleans area, *Amaryllis* are grown in a fashion that makes them very vulnerable to low temperatures. Some are planted with 1/3 to ½ of the bulb out of the ground. The American clones are so prolific that sometimes the offsets force the mother bulb entirely out of the ground. In such a condition, the bulb is completely exposed to the elements. Under these conditions, a great number of *Amaryllis* bulbs were lost in the severe freeze.

*Amaryllis* bulbs planted in raised beds or even at ground level, can survive a severe freeze if properly mulched. Hay, processed sugar cane fibers (''Serval''), grass clippings, peat moss, or any suitable material can be used to good advantage. If the freeze is prolonged, a layer of soil over the mulch gives a better protection. The labor involved in applying the mulch properly should be weighed against the surer method of lifting the bulbs and storing them till spring.

A sure method of saving potted *Amaryllis* bulbs from freezing, is the cold frame-saw dust arrangement. This is merely an enclosure with boards to accommodate any number of pots. One was built to take care of 65 7″ pots. It was intended to make unneccessary bringing the potted plants inside during mild freezes. The construction is of boards with the back about 4″ higher than the front. The top of the end boards is tapered to the front so that when window sashes are placed on top, a fairly neat fit is obtained. The enclosure was built to take four window sashes laid on top side by side. These were loose and could be removed at any time for ventilation. The 7″ pots were placed inside and sawdust was packed firmly between the pots up to the rim. As a precaution, DDT wettable powder was sprinkled generously over the pots and sawdust and watered thoroughly.

This arrangement was satisfactory for mild freezes which we are accustomed to. When the temperature dropped to the low 20s the first day of the severe freeze, 30# felt was tacked all around the box. Two sheets of plastic film was then tacked on to the top of the box and the window sashes were placed on top of this. As an added precaution, a 100-watt light was placed inside and left on throughout the freeze. The success of this arrangement was proved when only the leaf of a small offset froze. This leaf had been resting against the boards on the north side of the box. The foliage, sawdust, and pot soil never froze.

It was also noted that bulbs planted with 2″ or 3″ of soil above the neck, were not damaged. Some of the bulbs planted with part of the bulb above the soil, suffered damage to the outer scales. The stem was not damaged and these bulbs are now growing back. In some cases, the stem froze and left the scales and basal plate in fair condition. It was found that these bulbs could be cored and replanted. These cored bulbs produced a fair number of offsets. Cored bulbs are those that have a round hole through the center of the bulb and the basal plate—a rim of the basal plate is left on for new roots to form on. Bulblets will be formed on the inside of this rim. The bulb is planted in the usual manner and a wide-mouth jar is placed over the bulb. This keeps the water from getting inside the bulb. When leaves from the bulblets are seen growing out of the neck of the bulb, the jar is removed. This method can be used with uninjured and damaged bulbs.

The blooms which followed in the spring from bulbs apparently not damaged by the freeze, were not quite up to expectation. Some were twisted or deformed to some extent. Others were small and did not last very long.

Reports from growers and personal experience showed that the seeds did not fully mature. Only about 1/3 to ½ of the seeds were fertile. Of those that were good and planted, germination was only about 50%.

So, at the expense of some high priced Amaryllis bulbs, we gained knowledge about freeze damage that may be very valuable in the future.

## ADAPTABILITY OF HYBRID AMARYLLIS

Mrs. A. C. Pickard, *Houston, Texas*

The never-to-be-forgotten freeze of January 1962 took its toll in the blooms of Dutch hybrid *Amaryllis*. The freezing of so many of the buds, leaving only a small percentage of a normal season of bloom was quite a catastrophe in ways other than just loss of bloom. It cancelled Amaryllis shows, as all gardens were damaged to the same degree. Newly acquired or recently transplanted *Amaryllis* were also damaged to the extent of bulb deterioration. The bloom of the lesser damaged bulbs were below average in quality. The scapes were crooked, with flowers of poor form and colors hardly recognizable for the clone. The damage to foliage varied. It seemed to depend how far it had progressed.

The Amaryllis growers that made provisions as to protection with a heavy mulch found with Spring weather, a lush comeback of a great percentage of the bulbs. It seems that a bountiful crop of offsets are in the making from the basal plates of damaged bulbs. This record breaking freeze put the Amaryllis Dutch hybrid in the front for endurance and tolerance of abnormal weather conditions in the Gulf Coast area.

The chief difference between garden *Amaryllis* of today and those of a generation ago is that most modern ones are of the hybrid origin and have been worked into a flower more beautiful and more adaptable. From the hybridizers gardens it is a safe forecast that new frontiers are still ahead in the work with these flowers, unlocking new treasures of form and color to bring distinction and richness to gardens and homes.

There might be something of value to be gained by studying the performance of seedlings grown and developed within the area, as to their tolerance of climatic conditions.

To the many new hybridizers, my advice, based on past experience is to select carefully the varieties you wish to cross. They should have clear color, good texture, pleasing form and sturdy scapes. I have found it most helpful to walk along the garden path when the *Amaryllis* blooming season starts and with a ''seeing eye'' look for color, form and substance. Later in the day I make a return trip to see how those stood the test of rain, sun and wind and find it quite helpful to have a critical eye for marking the outstanding clones. These are saved for future observation until the final decision.

A hybridizer should not be in a hurry to name and introduce a new seedling that at the moment seems perfect. It should be tested for at least two years, so that one can observe the actual color and size. Seedlings should be compared to see if it is really different in color and is well behaved according to number of blooms per scape.

In looking back over my hybridizing it seems as if I have been reasonably successful in carrying out my theories of breeding. However, there have been disappointments but there is no thrill quite equal to seeing a beautiful seedling unfold and show that you have helped to create a new and beautiful flower for others to enjoy with you.

The basic policies, upon which the ''Houston Amaryllis Society'' (affiliated branch of the American Amaryllis Society) was organized in 1957, are to develop a greater knowledge of ''knowing, ''growing,'' ''showing'' and ''sharing.'' This has been demonstrated by the rapid strides of varied activities that have been made in the Society.

We have those who strive to show the best garden display. Others make the best arrangements. Then, there are those who work all winter planning crosses on paper and then—come Spring—rush out each morning to beat the bees to gather pollen. They also spend some time looking and comparing blooms of seedlings to see if the plants merit further watching or the compost heap. These are some of the individual activities that occupy our time.

Our most important service to Amaryllisarians is to assist the show chairmen in proper classification and regulations for judging Official

Amaryllis Shows in order to insure fairness of competition in a maximum of classes. We also compile show schedules and supply official judges. We advise clubs and horticultural organizations on various aspects of culture and propagation of *Amaryllis*

The services are available to all Amaryllisarians and the membership continues to lend assistance and promote the highest standards far beyond the realm of Society Membership.

## ZERO WEATHER AND AMARYLLID SURVIVAL

CLAUDE W. DAVIS, *Baton Rouge, La.*

During the period of January 9th to 12th, 1962, the Lower Mississippi Valley experienced the coldest spell of weather of record for the past fifty years. For four successive nights the temperature at Baton Rouge, Louisiana was 10° F., with daytime temperatures never getting above 20° F. Night temperatures at New Orleans were down to 12° F., and North Louisiana and North Mississippi had near zero weather.

Gardeners generally were unprepared for such severe cold in an area where the winters are normally mild and as a result losses of tender and half-hardy plants were heavy. This was especially true of the Dutch Hybrid *Amaryllis* which were being grown in the open ground with the bulbs partially exposed. All forms of seedling Amaryllids and mature bulbs which were left outside in pots and flats were killed completely. This included seedling *Amaryllis, Zephyranthes, Habranthus* and *Crytanthus,* all of which were a complete loss.

There is a brighter side to the picture, however, because from this experience we learned something which will be of value in the future. The most important is that hybrid *Amaryllis* growing in the open ground were not injured where the bulbs were completely covered with soil up to the neck of the bulb and the bed was then mulched with leaves, straw or sugarcane bagasse which kept the ground from freezing. Growers in Shreveport and in Ferriday, Louisiana report carrying their *Amaryllis* through zero weather under these conditions.

In the garden at Baton Rouge established plantings of Crinums, *Hymenocallis, Zephyranthes,* and *Crinodonna corsii* survived 10 degree weather in the open ground without damage, but a report from Ferriday, Louisiana indicates that the various forms of *Zephyranthes* were killed by zero weather, whereas the Crinums survived this much cold.

*Habranthus robustus* came through the cold in Baton Rouge with a light mulch of bagasse around the plants, but mature bulbs of *H. brachyandrus* and the hybrid, *H. x floryi* were killed even though partially protected by a mulch around the plants.

## NOTES ON AMARYLLIDS IN MICHIGAN, 1962

DONNA N. SCHUMANN

After four summers of growing Amaryllids in Michigan we now feel that while most of our various species can be grown here some are more successful than others and we should plan our future plantings accordingly.

For our first attempts at growing our plants in this new climate we planted them in full sun with a southern exposure. The results were described in Herbertia, 1961. Since then we have varied the locations and found that a garden area that is shaded by an adjacent woods all morning with increasing sun exposure through the afternoon has been most favorable for our species. Soil moisture has probably been an important factor in this area since it does not dry out as quickly after rains or waterings as the area in full sun.

*Zephyranthes citrina, Z. brozosensis, Z.* sp. (Clint; ''Valles''), *Habranthus robustus*, and, especially, *Z. smallii* have improved markedly in the new area. They have all multiplied nicely and have bloomed repeatedly from the time of planting in early May throughout the summer.

*Z.* sp. (Clint M-375), *Z.* sp. (Clint M-292) and *Z. grandiflora* have done equally well in both the full sun and the shade-sun areas. In fact *Z. grandiflora* has been the most rewarding of the small bulbs and has maintained nearly continuous bloom.

*Habranthus brachyandrus, Z. insularum, Z. macrosiphon, and Z. drummondii* have been very reluctant to bloom although the foliage growth appears good. *H. cardenasiana* has completely failed to blossom in the new area although it did in the full sun area. Perhaps a modification of the full sun area would improve the blooming qualities of the above plants.

*Chlidanthus fragrans* and *Z.* x *ruthiae clone* 'Ruth Page' have proved to be enigmas. Their foliage is excellent. They have multiplied many times their original number. But they won't bloom. I fear they must be considered unsuitable for growing in Michigan.

The larger bulbs of the *Hymenocallis* (subg. Ismene), Sprekelias and Crinums have continued to put on their lovely displays. They have all proved to be fine garden flowers regardless of where they are planted. They have not suffered in the slightest from the long winter storage to which they are necessarily subjected.

*Crinum* clone 'Cecil Houdyshel' and *Crinum* x *powellii* var. *album* have survived three winters next to the house foundation and are now of tremendous size. This summer 'Cecil Houdyshel' rewarded us with *four* stalks of lovely pink flowers and *C. powellii* var. *album* produced three stalks of its white flowers. Since these plants have been so unexpectedly successful we have now planted *C. kirkii* and *C. erubescens* and will try a hardiness test on them this winter.

The only small amaryllid to survive a hardiness test was a clump of *Z. candida* which was also planted next to the house foundation. A similar clump planted away from the house in an open garden failed.

A *Brunsvigia rosea* (Cape Belladonna) bulb which was planted next to the Crinums last summer survived the winter but has to date failed to flower. It will be left in place and tried again through another winter.

*Rhodophiala* is known to be somewhat hardy so we were especially pleased to receive some seeds from Dr. Traub so that we might try them in our climate. We have a pot of them growing now and they will probably be ready for a permanent garden location by next summer with a hardiness test following in the winter 1963.

*3021 Fleetwood Drive, Kalamazoo, Michigan*

# THE 1961-1962 AMARYLLIS SEASON

Robert D. Goedert

*Box 6534, Jacksonville 5, Florida*

The 1961-62 season was marked by the most severe cold spell in the deep south in many years. Most of the Gulf states were seriously hit by a cold wave that lasted several days with temperatures well below freezing. Many reported that they lost large numbers of bulbs and some even lost their entire collections. Many placed their potted plants in closed frames or in their garages which normally provided protection. The cold lingered long enough so that this protection was inadequate. When the cold weather was over many of the potted amaryllis were frozen. Bulbs in the open that were mulched came through in good condition but where they were not protected many were lost.

Peninsular Florida escaped most of the cold. The only apparent damage was a reduction in flower spikes. In the northern section of the state the scarlet *Amaryllis belladonna* (species) made only an occasional bloom this season. Damage in Texas was so great that some shows were canceled and even in Brownsville severe damage was reported.

The interest in amaryllis has not waned and many started making plans to rebuild their collections practically before the weather cleared. As these collections are rebuilt it appears we may be entering a new era in amaryllis culture. Many are replacing their border plants with the Dutch, Tunia's Australian, Tunia's X Dutch and other improved strains. This should stimulate more interest in amaryllis as these better hybrids are seen by the public.

The ardent show exhibitor is being more discriminating and is trying to be very careful to replace with only the truly good named clones. Some are buying only the newer clones; others are purchasing several of the older tried and truly worthy ones. Many have learned that it is better to have several of a good clone than many of those that are not reliable bloomers. The Dutch strain is still most popular but others like the African strains are gaining in popularity and surely will compete with the Dutch hybrids in the future.

As the quality of our garden clones improves, greater interest in exhibiting will surely take place and there should be rapid improvement in the number and quality of unnamed hybrids at the shows. The general public should increasingly be encouraged to participate in the shows. Greater participation will expand interest and generally promote improvement in the clones offered to the public.

There is one thing I would like to suggest to those rebuilding their collections. Do not get over enthusiastic about the new ones even if you can afford it. There are a number of older clones that will be with us long after some of the new ones are forgotten. The true evaluation of a clone can not be made for several years. Do not get the idea that I am saying all new clones are not worthy for only in the new ones can we look for improvement. We surely need to purchase the new ones to encourage the hybridizers. My point is—don't overlook those clones you know are good just to buy something new. It is better to purchase three or four bulbs of a good clone than just sheer numbers of clones. It is always exciting to grow new clones and I am sure most of us can hardly wait to read the descriptions of the new ones each year. Opinions of the previous season are always welcome. By this means we often make up our minds for which of the new and higher priced introductions we will go overboard, and try next season.

Amaryllis appear to have an inherent weakness and one should understand this in judging new clones. Many clones grow vigorously until they reach maturity, make a wonderful or even spectacular display and then decline or become difficult to maintain in a flowering condition. You will note this among beds of seedlings and among your named clones. In certain cases possibly this one outburst of flowers may justify purchasing bulbs of certain ones. There are a few clones, I feel sure, that after reaching maturity you might as well cut up and start new plants. The young plants from such cuttage will grow vigorously to maturity only to decline again after flowering one or two seasons. I am sure you have observed this but many do not want to recognize it and want to blame their failures with these clones on some cultural defect. I do not mean to say that every clone that fails has this characteristic for there are many pitfalls in the culture that contribute to poor flowering.

The two most exciting newer varieties of the past season appear to have been 'Rilona' and 'Pink Beauty.' 'Rilona,' a light salmon buff with very dainty ruffling in the throat, is different, beautiful and appears extremely vigorous. Even the bulbs are beautiful to me being very uniform. It should become a leading variety and is the first one to challenge 'Bouquet' for first place among the salmon colored ones. You will surely hear more about this variety. 'Pink Beauty' is more a novelty in white flushed pink. The petals are so wide the flower appears double. It made many friends and will be extremely popular this coming season.

In commenting on the previous season one can not omit making remarks about the older clones; however, my main purpose is to comment on the newer ones and if I forget to mention one of your favorites forgive me for I can not in this small space evaluate all varieties. This year I would like to comment on the varieties by color and shade as I get many requests for this or that shade and this may help some in determining the particular shade you may be seeking.

## WHITE CLONES

The whites are always popular having many old and worthwhile varieties among them such as 'Maria Goretti,' 'Ludwig's Dazzler,' 'White Christmas' and 'Queen of the Whites.' These and others are still popular and worthy. Another older one I fall in love with each time I see it flower is 'Mount Tacoma.' It has an ivory cream color that sets it aside from others. I may be unduly fascinated by this variety but I do feel it deserves your attention. Most whites can not be distinguished from another unless you read the name tag on it but 'Mount Tacoma' is an individual. Ludwig's 'Christmas Gift' is a fine standard late variety and 'White Favorite' gains in popularity each year. Warmenhoven's new variety, 'Oasis' (Snow Queen) is acclaimed by many as the top white. It is large and performs well and is worth watching. Warmenhoven's 'Mount Blanc' is a large ruffled white clone that will become more popular now that it is more reasonably priced. Van Meeuwen's 'White Christmas' gains in popularity each season and their new clone as yet unnamed was made available to a few this past season. It was well received and appears to be free flowering. Being fragrant it will become very popular. 'White Crane,'' another new tall white, is large and robust and will make its self felt at the shows. It is a good performer and will surely become popular. Only a few bulbs were available this past season and it will be scarce for a number of years.

Of all the whites to date 'Maria Goretti' has possibly the best reputation. It is a good shipper, fairly easy to flower, is fragrant and just a good all around variety. It also sets seed and many others do not. Many that hybridize often write that this or that one will not set seed. You will find the following varieties set seed easily: 'Maria Goretti,' 'Christmas Gift,' 'Nivalis,' and 'Leading Lady.' These should not fail you.

## WHITES WITH COLOR

A fleck of color or a faint penciling, in my opinion, lends character to the white flower. Two in this class, Ludwig's 'Peppermint' and Warmenhoven's 'Marion' are available. Van Meeuwen expects to introdue a third, 'Siren,' in a few years. 'Peppermint' was liked by many but some complained of too much color. 'Marion,' a very large ruffled one with faint penciling, was well accepted. As light has a great deal to do with the amount of color in this type flower the grower will have to find which one does best in his area. An ideal clone with just the right amount of color will surely be developed. Mr. Rice of Valdosta, Georgia, has many seedlings of this type that are excellent. Possibly some day he will be able to offer named clones.

## WHITE FLUSHED

'Apple Blossom'' is the indisputable leader in this class and this year became the most popular amaryllis in the world without a doubt. It is a wonderful variety and one that will be around for many years. 'Love's Desire' is beautiful and has more pink in it. It gains popularity each year and is a vigorous free flowering variety. Both clones give excellent results from small sized bulbs and make beautiful border plants in the south. 'Pink Beauty' is a new sensation in this color. Its petals are so wide it appears double. It has good color and will become popular. 'Floridade' is much lighter and needs quite a bit of shade to give it the white blush pink color that is so popular. It is large and very beautiful when well grown. 'Little Diamond' possibly belongs here also and is really more of a pin stripe pink and white that appears pink. It is very large and has that perfect round flat flower. It possibly has the best color and form of any pink amaryllis. 'Golden Triumphator' is much like 'Floriade' except for the color being in a beautiful golden orange on white. This one also takes shade for best coloring. It is extremely large and under proper cultural conditions is exquisite.

### PICOTEE TYPES

The picotees introduced by Ludwig & Co. are very popular. With the introduction of the named clones 'Dutch Doll' and 'Square Dance,' this type should become even more popular. The picotee type is relatively free flowering, has a loose airy form and is most artistic. They are without a doubt one of the most beautiful forms of amaryllis and especially deserve your attention.

### WHITE STRIPED

The leading show clone in this color is 'Zenith.' It is extremely popular in the Texas area and often takes the best in the show. 'Silver Lining' is large and very popular in the Mobile area. More in this color are needed; however this has never been a popular color. Considering this it goes without saying that 'Zenith' can be spectacular to win best in the show with this handicap.

### BICOLORS

'Beacon' is the only salmon pink and white. It is large and an exceptionally nice clone. 'Verona' similar in salmon orange and white is a very nice addition. It has a clean appearance and grows rather vigorously. 'Candy Cane' still remains popular with many. 'Fantasy' still ranks among the best in rose and white. 'Royal Dutch' with similar color was introduced last season. 'Five Star General' is a very handsome clone when grown well but appears to have cultural difficulties that may eventually eliminate it. Van Meeuwen's Rostenlii in red and white is prized by quite a few. It apparently is becoming more popular each year but is still not extensively known.

### BLENDS

'Sweet Seventeen' and 'Pinksterflower' are possibly the leaders of this type. 'Sweet Seventeen' is a beautiful large shrimp pink. 'Pinksterflower' is similar in form but more in the orange tone (referred to as Azalea pink) and is a most robust plant that does well in the border in the south. 'Floriade', 'Golden Triumphator' and 'Little Diamond' might be included, however they were discussed under the white flushed varieties.

## ROSE PINKS

Possibly the lightest in color is 'Flora Queen'. It is a beautiful soft light rose pink with slightly lavender caste. It is very scarce and is much in demand and is a truly beautiful clone. 'Daintiness' is still liked by many—a light rose pink with green throat. It is large, round and a good grower. 'Sight Show', new last year, has nice coloring but appears to be less robust. In the medium rose pinks 'Queen of Sheba' is becoming very popular. It has a lavender cast that many like, is large and grows vigorously. Ludwig's 'Pink Favorite' and 'Pink 'Perfection' still remain popular.

## ROSE REDS

'Bella Vista', a medium rose red, is a strong contender for the ranking place. It has good color, size and grows very vigorously. 'Queen of the Pinks', 'Doris Lilian' and 'Diamond' are also popular. 'Elvira Armayo' is a large flowering clone with a lavender-purple caste. It is becoming very popular as many rave about its color. 'Violetta' still remains popular with some collectors as it has that classic round flat form.

In the darker rose red color the Warmenhoven varieties 'Moreno', 'Mysterie' and 'Bordeaux' pretty well dominate this color. Bordeaux is the darker. All have fine coloring. 'Beau Jolais,' a small flowering clone, has beautiful coloring. It is a most worth while plant and one that more should try.

## WINE REDS

'Red Master' still leads this class and is still one of the most popular amaryllis being second only to 'Apple Blossom'. 'Mohawk' appears to be as large though it may be a little lighter in color. It makes 4 flowers per spike whereas 'Red Master' seldom makes more than two. From one season's performance 'Mohawk' appears to be a challenger. 'Red Master' however has been popular for many years and will be one hard to displace. 'Blazing Star' is of similar form. The color is generally lighter but I consider it a contender in this color. It is a very worthy clone being large and beautiful. 'Tristan' still remains popular. 'Alcyone' is a fine clone with beautiful color but flowers are not as large as the others in this group.

## PURPLISH-RED

Three amaryllis are generally considered in this group; 'Purple Queen', 'Charlemagne' and 'Superba'. Many make claims for 'Purple Queen' as the leader in this color. 'Charlemagne' is very similar and is becoming very popular. Now that 'Purple Queen' is more popularly priced these two clones will slug it out. Both are good plants. 'Superba' is small and generally darker under ideal conditions. It can be truly beautiful and its admirers will surely not give up pressing it for 1st place in this color. Some may consider 'Tristan', 'Alcyone' and 'Red

Master' in this color. Cultural conditions influence color a great deal and some will be much darker in one area than in another.

### DARK REDS

This is a popular color and new clones are introduced each year as the search goes on for the truly black red. 'Queen Superiora' has been around for many years. It is one of those old classic dark reds that is still popular. It has some new contenders. 'Hades' and 'Rotterdam' are two clones that are very similar and are nice dark reds with a fiery sheen in their throats. Both are beautiful and exceptionally nice plants. 'Franklin Roosevelt' is very popular with many. 'Red Majesty' and 'Royal Ruby' are two other nice dark reds.

### MEDIUM REDS

The medium reds include many popular ones. The most popular is 'Ludwig's Goliath'. It is a huge one and always scarce. One that is nearly as large but seldom seen is Warmenhoven's 'Red Champion,' a huge flower that is relatively easy to bloom. This is an old clone that is little known because of its high price. Now that the price has been reduced it will become better known and surely will become a leading show clone. 'Giant Goliath', another large one, is very popular in the north and is well liked by many. 'Wyndham Hayward,' 'Ludwig's Scarlet' and 'Scarlet Beauty' are other poplar reds in this shade.

### LIGHT REDS

Few are available in this color. 'Red Emperor' is a nice bright red that makes new friends each year. This is a neglected color and one to which the hybridizers should give more attention.

### ORANGE REDS

This is a color that is becoming more popular. 'Traffic Stop', 'King Gustav', 'Lucifer', 'Don Camillo', 'Cherokee' and 'Friendship' are among the more popular ones. 'Halley' is an easy growing burnt orange red.

### ORANGES

Many of these may be classed orange red or salmon. The following appear orange to me and I like to think of them in such a group. 'Orange Wonder' is without a doubt the leader. Though high priced it out sells most other amaryllis and possibly is among the top five most popular amaryllis. It is a beautiful bright orange with a darker throat. The flower has exceptional form and the plant is a fine vigorous grower. Ludwig's 'Delilah' is a light orange and the only one in this particular color. It is a beautiful soft orange that makes a wonderful show flower or border plant in the south. You will find 'Delilah' an exceptionally faithful clone. 'Camellia' is a new beautiful salmon orange when flowered in full light; leaning to salmon if given a bit of shade. It is a worthy new clone. 'Salmonetta' is another free flowering amaryllis and has beautiful dark green foliage. There are a number of other good ones in this group and all command their admirers.

## SALMONS

'Bouquet' has been the leader in this class for a number of years. It is a truly beautiful clone of begonia pink with purple midrib. It is very vigorous and does well at the shows as well as being an excellent garden plant. 'Rilona' is a sensational new one in this color. It is a light salmon buff and apparently has everything; color, form and vigor. It is slightly ruffled and has a dainty ruffling in the throat. It will fast become a leading clone—a different shade from 'Bouquet'. Both will remain popular for many years. 'Queen's Page', 'Salmonea' are other popular clones in this color.

## SPECIES

The species still command quite a bit of interest. Possibly the most noteworthy introduction this past season was one received as *Amaryllis cybister* from Brazil. At this writing the plants I have growing of this species are very vigorous and it appears from the different coloring in the leaves that there may be more than one color or type among them. Gathered at the same time was another species (unidentified). The foliage is lanceolate-elliptic. Both were gathered by an experienced collector using the habitat information in Dr. Traub's Manual. Both collections were found growing to a depth of as much as 6″. I have written my collector asking him to furnish more information regarding these species and we plan another collection trip into the area in the near future.

Another form of *A. aulica* was received from Matto Grosso, Brazil this season which I numbered 11/62. This is the sixth form of *A. aulica* I have obtained from Brazil. Each is said to be for a different habitat and it will be interesting to see these flower. Species No. 1/59 flowered last season and I should have at least a dozen to flower this season in October. It is definitely in the *A. aulica* group and has very narrow tepalsegs—possibly it is variety *stenopetala*. All the *aulica* group grow well here. I have found a mixture of peat and perlite to be best. I mix a good portion of dolinite lime and bone meal in the potting mixture. They are planted several to a 6 or 7″ pot. The largest bulbs are now 3″ or more in diameter. I find planting several bulbs to a pot helps their environmental condition considerably. *A. aulica* appears to take temperatures down to freezing without losing foliage and grow best during cool weather. They usually go dormant in June or July and start growth again in September and usually flower in October.

Species are becoming more difficult and more expensive to obtain. This is possibly due to the unrest in the South American area.

## NEXT SEASON

This coming season you will see many new clones. The first five named clones of the HDL-G (see Fig. 24) African strain will be introduced. 'Rosaline', a new blend of brick pink and white, is a beautiful large flowered clone and a new color in amaryllis. 'Tangerine,' 'Orangedale' and 'Terro Cotta' are nice clear orange reds. These three are not quite as large as the average Dutch hybrids but are of very nice form and color. 'Ruby Glow' is a free flowering dark red with a ruby throat. It also is smaller than most Dutch but a clone that should make a fine pot plant. These are all raised from off sets so should make vigorous border plants in the south. Some clones on trial the first year have made as many as five offsets. These five clones to be introduced were picked from 20 tested last season. This coming season 10 additional clones will be tested. These will be in the white-flushed-pink and wine red colors. The best of these will be introduced next season. The HDL-G Company expects to eventually introduce a full line of colors in the named clones.

Van Meeuwen has released several new clones this coming season in very limited quantities; 'Aphrodite', deep red with white throat; 'Belinda', dark velvet red; 'Cupido,' salmon pink; 'Hellas', stone red; 'Minerva', white with red border; 'Mars', blood red; 'Parsifal', bright red; 'Rembrandt', blood red; 'Rose Mary', rose. The Van Meeuwen Company has made great improvement in their amaryllis and are widening the range of color considerably. In the past few years such clones as 'Camellia', 'Hades', 'Queen of Sheba', 'Rilona' and 'Zenith' have been introduced. This year's introductions, if of the same quality will surely be excellent additions.

W. S. Warmenhoven is not offering any new varieties this season. Their recent introductions: 'Floriade', 'Golden Triumphator', 'Little Diamond', 'Marion', 'Oasis', 'Pink Beauty', 'Rotterdam' and 'Sjoukji Dykstra' are worthwhile additions.

The firm of W. Warmenhoven & Zonen has split up. C. Warmenhoven is offering this firm's named clones and three new ones; 'Topscore', red; 'Apollo', orange red; 'Flamboyant', scarlet red. The prices of this strain have been reduced so more people will become familar with them. This is a very worthwhile strain.

Ludwig this season is offering six new varieties. Two picotee types, 'Dutch Doll' and 'Square Dance', will without a doubt be fine additions and most welcome. Two reds; 'Home Decorator', 'Poppy', red and 'Trixie', cherry red, are to be introduced. These two reds appear in particular shades that should be a fine addition. One new striped clone, 'Streaking Stripes', is being offered. The striped ones are picking up in popularity. Many will want to try this clone. 'Winter Carnival' is a new large white with a suggestion of yellow. New whites are always welcome.

Other clones from different growers are appearing. The Van Waveren clones are again being offered retail. They are offering many new ones unknown to the American market. 'Bon Ton', rose; 'Clown', striped; 'General Eisenhower', salmon; 'Kathleen Ferrier', white; 'Red

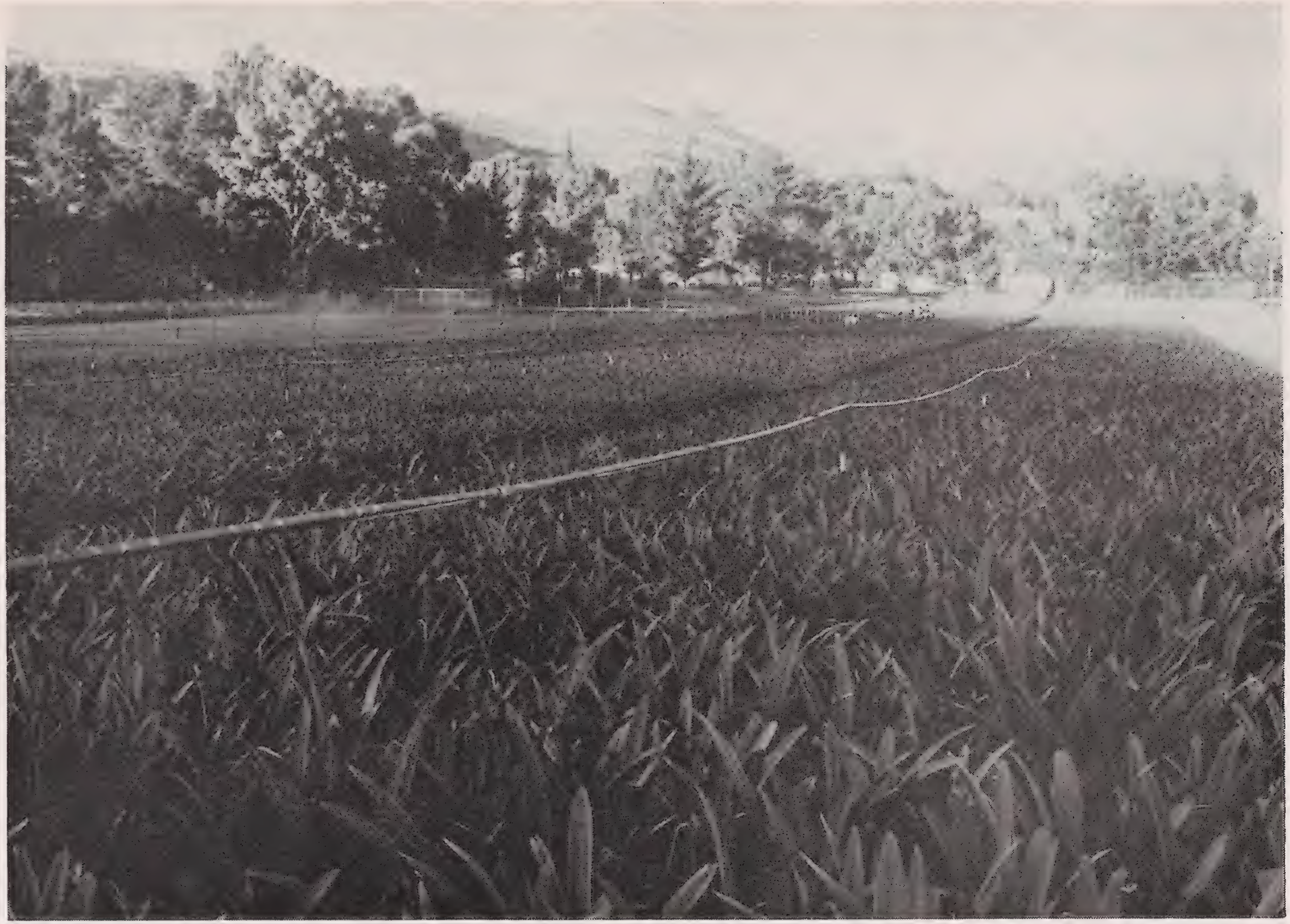

Fig. 24. Part of the Amaryllis field of Harry de Leeuw Company [HDL-G] in Transvaal, South Africa. Originators of a new strain; the first five named clones registered and introduced in 1962 by Robert D. Goedert, Box 6534, Jacksonville 5, Florida.

Lion', red; 'Royal Velvet', dark red; 'Salmonea', salmon and 'Scarlet Beauty' are some of their older clones of merit.

Other small growers are introducing their new and best named originations to the American market through American dealers. 'Mohawk' and 'White Crane' are two fine clones from one of these companies registered and introduced last season. From this same company comes another interesting novelty, 'Personality', an orange red and yellow striped variety. I have seen similar colored amaryllis from India and they are rather pretty and interesting. Many of these small companies want only to sell their very best clones on the American market. They feel the American customer is a very sophisticated buyer and that only by introducing worthy ones will they be accepted.

The absence of comment on the Boshoff-Mostert strain from South Africa is due to my lack of knowledge of these amaryllis; otherwise I would discuss them. These amaryllis have more than likely been picked by a little different standard than we are used to with the Dutch hybrids. It takes one some time to get used to new styles and it goes without saying that many of these clones will be welcomed by the American fancier. It is generally considered that this strain is a rather vigorous one.

[See Mrs. Seale's article on the Boshoff-Mostert strain in this issue of the Year Book.—*Ed.*]

Great progress is being made in hybridizing and new colors and forms are being introduced each year. Generally we are forgetting the smaller and medium size sorts as the larger ones are more spectacular show flowers. The smaller kinds are especially suitable for house plants and should become popular for this use. The show people would be of great help in popularizing this type if they would give them a more prominent place in the shows.

## AN AMATEUR'S GROWING PAINS

Andrew H. Grubbs, *Washington*

My interest and experience with amaryllis goes back to a childhood in Minnesota and forward to the present day. Considering the foregoing statement, I ought to be a mine of amateur information on amaryllis, but strangely enough I did not have a single success with an *Amaryllis* until the year 1947. Before that I had only seen those old fashioned *Amaryllis,* that two or three times a year would push up a bud, and in time there would be pale orange or brick red flowers.

A neighbor woman had a clump of these relatively small bulbs growing in a large pot, and seeing my interest in these flowers would from time to time give me a cluster of bulbs cut from the edge of her pot full. They would grow well during spring, summer and fall only to succumb to freezing at some time during the cold winter nights, when wood fires would get too low or go out, as they sometimes did. I then tried growing them during the warmer weather and wintering them in the vegetable cellar. Why they did not bloom with this treatment, I do not know, unless the winters were too long or they didn't survive long enough without mishap to become of flowering size.

It was some years later, in 1947, that I chanced upon just one huge *Amaryllis* bulb in a store in Missoula, Montana. Its price was fifteen cents. It was spring time and I was planting a flower garden, and so I bought the bulb and planted it in my garden. Here I made a mistake right at the start. I planted it deeply, well below the surface of the ground. I waited, not too patiently, for it to come up, when I thought it should be up I would dig down until I could see the top of the bulb, I would feel that the bulb was still firm and I would cover it again and after a couple of weeks would repeat the performance. Cold weather came in the fall and I dug the bulb and found it exactly as it was when it was planted. Not even a root had formed. Disgustedly I rolled the bulb in a thick tube of newspapers, pinned the ends shut and stored it in a warm closet. I do not know how long it was before I thought of the bulb again. When I did and unrolled the paper I was amazed to find that the bulb had long foliage and a fully developed flower scape on which were the remains of the withered flowers. I potted the bulb and fortune smiled upon me. It sent up another scape and flowered beautifully. The flowers were larger than any I had seen and were white striped with red. I thought to myself, surely these are something new in *Amaryllis.* Perhaps a mutation or a sport. Imagine my surprise when I began telling people about my unusual *Amaryllis* only to learn that that was the only kind they had ever seen. They were then more common than the old orange ones of my childhood.

Noticing the large pistil of this amaryllis and the copious supply of pollen, I pollinated it with its own pollen. It produced a large, healthy seed pod. When the pod opened and I saw the hundreds of tissue paper thin seeds I thought there was not body enough to them to contain a viable embryo and were therefore too immature to grow, however I took the seeds with me and left the bulb behind when I left Missoula.

Some months later, I planted the seeds and was surprised at the large number of seedlings and their rapid growth. This pleasing experience started me to seeking more information about *Amaryllis* and the colors that were available.

My next bulb was given to me by a friend in Minneapolis. It had not bloomed for her but she said that the person, who gave it to her, told her that it was not an *Amaryllis* being greenish white and more beautiful than an *Amaryllis.* When it bloomed it was just like the Missoula bulb. My seedlings were also like their parent.

The third bulb added to the collection was scarlet red with faint stripes of a slightly different shade. This I assume to be one of the bulbs sold as the Meade strain. Later I bought three bulbs advertised as the famous Meade strain and the three of them were very similar to bulb number three.

Bulbs #2 and #3 were crossed both ways and all of the resultant seedlings were reds very similar to each other. The next find was a red Dutch hybrid called a Royal Dutch, though not named. When it bloomed, it was indeed a fine flower and I thought at the time that probably no better and not much different ones could be found. An answer to an advertisement brought me Mr. Houdyshel's catalog and the subsequent purchase of the two named clones, 'Violetta' and 'Moreno', dispelled this notion as well as the one about the prices of top quality imported bulbs. This catalog also made me aware of the American Amaryllis Society which is affiliated with the American Plant Life Society.

After I had received two issues of Herbertia and purchased Dr. Traub's Amaryllis Manual I fully realized the magnitude of the subject of *Amaryllis* and my limitations. Any hope of ever being more than a good amateur grower and breeder of just some of the members of the very large family quietly faded away. Be this as it may, there still remains the educational and cultural values of the pursuit. Some of these values are acquired by searching for information as one tries to grow with his hobby or avocation. Some of the interesting bits of knowledge consist of facts from geography, science, photography, soil management, and the like.

When a small greenhouse was added to our garden, I had visions of its being full of bright blooming plants the year around. This could not work with the kinds of plants I wanted because always part of the plants were dormant, part not ready to bloom and some just being started and all of them had to be housed at proper temperatures. It seems to me that at least three greenhouses or one with three separated parts would be needed for the collection I had, but it is certain that a large part of my troubles could be a lack of know-how.

My first collection consisted largely of gloxinias and they did very well but I was not satisfied because the plants were very large and I could not have as many as I wanted. Also as soon as hot weather came the blossoms were ruined by excessive heat.

Along with the gloxinias I had the several *Amaryllis* that I have already discussed. Their blooming was over before hot weather set in and the heat in no way prevented them from growing luxuriant foliage during the summer. Upon the basis of this, I conceived the idea that I still might achieve my original desire for continuous bloom by collecting only within the huge order of amaryllids, and so I began adding these, hoping that their needs would be nearly the same as those of *Amaryllis.* I knew nothing about most of these bulbs and selected them from book and catalog descriptions. Needless to say many of them were a disappointment. I bought more named Dutch *Amaryllis,* some species, American hybrid amaryllis, Oriental strains, Belladonnas and then for variety I added *Vallota, Nerine, Lycoris, Clivia, Eucharis, Hymenocallis, Agapanthus, Zephyranthes, Habranthus,* and crinums, as well as some others.

I feel sure that most of the readers of Herbertia already know that I did not achieve my goal. I will tell briefly what happened and perchance some experienced grower of these plants will write, in some future issue of Herbertia, more specific directions for their culture, than a catalog gives.

There is no reason for me to complain about the performance of the hybrid *Amaryllis.* Good cultural directions were available for them and they grew perfectly from the beginning, and each year since have made a splendid display. Many people come each year to see them when they are in bloom.

*Clivia miniata* grows well, blooms and is beautiful enough with about the same culture as *Amaryllis* except it has no dormant period. *Clivia* has the following disadvantages as a plant for small greenhouse. It requires a very large container and therefore takes more room than one can afford to give to it. It had scale insects when it came from the nursery and any treatment for them that I have found leaves the plant spotted and disfigured.

*Sprekelia formossissima superba* bloomed once in January and this last season in June. The catalog described this plant as evergreen, however I believe that it requires almost complete dormancy to bloom. I have only had blooms twice out of six years. It is a beautiful and interesting plant when in bloom. During the rest of the year its ragged, shaggy appearance does nothing for the appearance of the plant collection. I pollinated *Sprekelia* with pollen from an *Amaryllis* and got a seed pod but the seeds were shriveled and sterile.

*Agapanthus longispathus* rates about the same as *Sprekelia* though it is not as strikingly beautiful as sprekelia. It blooms once each year and its foliage is more erect and neat than that of *Sprekelia.* It thrives outside in the summer time. One other thing I can say in its favour is that the blooms last a much longer time. The larger *Agapanthus orientalis* (blue form), erroneously called Blue Lily of the Nile, grew well for a time but died before it bloomed. I know of no reason unless I used the watering can too generously. I often water too much during hot weather because I am away from home most of the time and get fearful, lest they dry up while I am gone.

Nerines—of these the catalog said, ''The only reason more people do not grow nerines is, they do not know how easy they are.'' For me they are exceedingly contrary. Instead of growing and resting in the seasons specified by the books, they grow off and on in any season without rhyme or reason it seems. They have produced good foliage and multiplied until they are root bound, as the book says they should be to get blooms. They are now four or five years old and have yet to bloom. They have grown all of this past summer and now, in early October they are still growing. It was my impression that they were supposed to die back in late summer and bloom in the autumn.

*Lycoris aurea* did not respond at all to pot culture. I then tried them in the outside garden where they were destroyed by the *Narcissus* bulb fly. Since they are not hardy I doubt that they could be brought to bloom out-of-doors.

*Lycoris squamigera* was planted outside from the start. It grows weakly and has small weak blooms, which soon fade away in our hot summer sun. Perhaps in a partial shade bed it would adapt itself to our climate.

*Eucharis*—that I haven't had success with this as yet is partly due to accidents and partly to unfamiliarity with its needs and habits. I still have a feeling that *Eucharis grandiflora* will be a desirable plant when I have mastered its culture. It grew well from the beginning and multiplied freely. I separated the bulbs and repotted them five to a pot. I kept them moist all the time, thinking that they would continue growing without resting but instead of doing that they all rotted except one bulb, which is now doing fine.

*Amaryllis ambigua* has grown at various times regardless of season. This year (1961) it has not begun to grow at all and it is now October. I repotted it during the past winter and let it remain dry until spring. When the weather got hot and it had not started growth I sank the pot in a shaded bed out of doors.

*Brunsvigia rosea* (Cape Belladonna) is often advertised as a good pot plant. Mine grew luxuriantly in the greenhouse, but never bloomed. Outside it neither grows well, nor blooms.

The *Crinum* 'Cecil Houdyshel' has proved hardy here and grows well but its flowers have been consistently very small and short lived. The plant is growing in full sun for two thirds of summer days and it is quite possible that our desert sun is too hot and the plant would do better in partial shade.

Hybrid *Amaryllis*—when one amaryllis blooms it is beautiful but when a large number of them are in bloom at the same time they are almost breathtaking in their beauty and one thinks of the Master's saying, "Not even Solomon in all his glory was arrayed like one of these".

Aside from their beauty when blooming, the thing that makes *Amaryllis* growing so intriguing is the ease with which they can be hybridized, leaving no doubt that a genuine cross has been made. I now have seedlings from 31 successful pollinizations. The first ten crosses have bloomed and each year there will be several new ones to look forward to. The first ones are all red but some variations are beginning to show up now.

Most of my crosses have American hybrids as the seed parents and Dutch hybrids as the pollen parents. The reason for this is that I used my first three Dutch hybrids to bear seed and they were so weakened that it took them several years to get strong enough to bloom again.

When I wish to cross two fine Dutch hybrids I pollinate one and when the bloom starts to fade or sometimes after the pod has begun to grow I cut the scape and place it in a jar of water or plant it in a pot of clean gravel or sand and keep it saturated with a "Hyponex" solution. Normal seed pods form and grow well for a time but usually before maturity the pods shrivel and the seeds are also immature and wrinkled but usually I can get three or more of these, out of a pod full, to germinate. The resultant seedlings are also weak but by carefully

[**GRUBBS—AMATEUR'S GROWING PAINS**, continued on page 81.]

# SOME AMARYLLIS SEEDLING RECORDS

BURR CLOUETTE, *California*

In April 1962, 20 seeds of *Amaryllis calyptrata* were received from Mr. Quinn Buck. Germination started on April 22, and 15 seeds in all sprouted. By the end of 6 weeks from planting all of the seedlings had made the first leaf; the second leaf soon followed. By the end of July, the third leaf had formed. Each succeeding leaf was broader and longer, with the third and fourth leaves measuring 1/4 inch wide, and 8 to 10 inches in length.

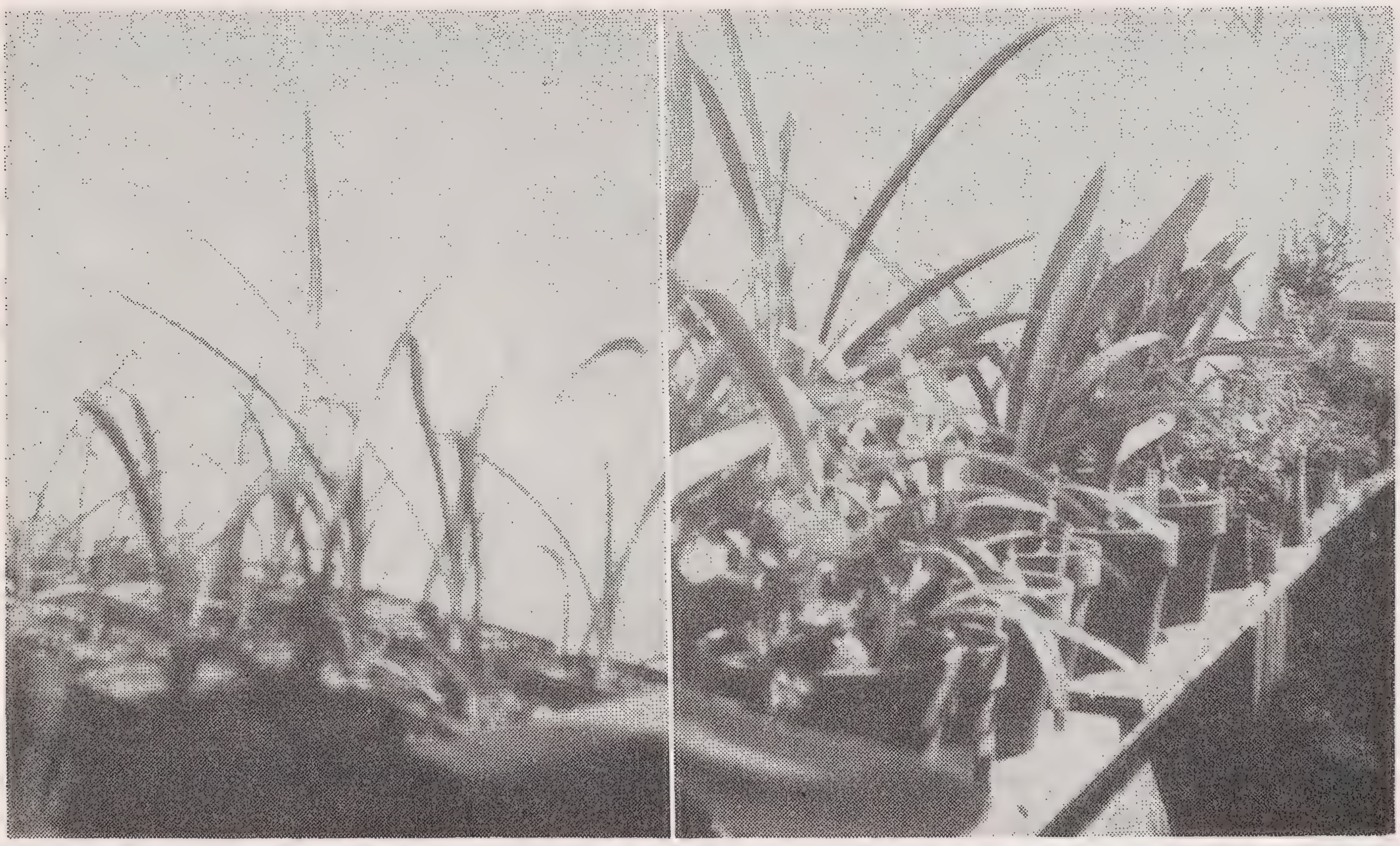

Fig. 25. Left, *Amaryllis calyptrata* seedlings five months from seed planting; Right, various Amaryllis seedlings. Snapshot by Burr Clouette.

On August 1, the seedlings were transplanted to 3-inch plastic pots. No setback was noted. At this writing (Sept. 15, 1962), all plants are growing well, and some of the bulbs are 1/2 inch in diameter (see Fig. 25).

The seeds had been planted on edge in ''Black Magic Planting Mix'', and were transplanted to the pots in the same mix. The seedlings were watered often enough to keep the soil moist, but not too wet. They have been fertilized with liquid fish solution at least every 10 days. Since transplanting outdoors, they were given part shade at first, but now are growing in full sun along the south facing wall. There they, and other *Amaryllis* require nearly daily watering.

I obtained 16 seedlings of *Amaryllis psittacina* from seeds given to me by Dr. Traub. At least 75 seedlings were obtained from a Peruvian

[**CLOUETTE—AMARYLLIS RECORDS**, continued on page 159.]

# TRANSMISSION OF A VIRUS INCITING AMARYLLIS MOSAIC SYMPTOMS

ROBERT P. KAHN and FLOYD F. SMITH,

*Plant Quarantine and Entomology Research Divisions, U. S. Department of Agriculture, Glenn Dale and Beltsville, Maryland*

Virus-like symptoms in Amaryllidaceae have been observed in field- and greenhouse-grown plants by many amaryllid enthusiasts. Some growers have attributed these symptoms to nutritional imbalance, whereas others have implicated viruses. However, *observation* of virus-like symptoms *per se* does not constitute proof of virus infection because many virus-like symptoms may be of physiologic or genetic origin. Symptoms incited by virus are distinguished from those caused by physiologic and genetic factors by establishing the infectious nature of the virus on the basis of transmission tests.

The objective of this paper is to report positive transmission of a virus from *Amaryllis* to *Amaryllis* and from *Amaryllis* to tobacco to *Amaryllis* and thus establish that *Amaryllis* mosaic is caused by at least one virus. We also wish to show photographs of symptoms known to be incited by virus for reference by amaryllid growers and recommend control measures.

## LITERATURE REVIEW

The scientific literature of amaryllid viruses was reviewed in 1942 by Hannibal (4), in 1948 by Brierley (2), in 1958 by Traub (12) and in 1960 by the senior author (7). These literature surveys revealed no reports of actual virus transmission from *Amaryllis* even though the *Amaryllis* mosaic disease has been known for at least 30 years. *Amaryllis* mosaic symptoms have been observed by many amaryllid growers, particularly under field conditions in the South. The pattern of spread of virus-like symptoms under field conditions suggested that an insect vector of a plant virus was involved. However, apparently no one had actually demonstrated transmissibility of an infectious agent from *Amaryllis* by isolating a virus from *Amaryllis* with symptoms and then transmitting this isolate back to healthy *Amaryllis*. Although an insect vector was suspected, none had been reported in the literature.

In 1959, Anderson (1) reported that ''mottled *Amaryllis* sp. yielded CMV'' (cucumber mosaic virus) in a survey of Florida weeds and cultivated plants that might act as reservoirs for pepper viruses. Although Anderson isolated Cucumber mosaic virus from *Amaryllis,* he did not report transfer of this isolate back to healthy *Amaryllis.*

*Amaryllis* mosaic disease (previously referred to as *Hippeastrum* mosaic) is not listed in 3 compilations of recognized virus diseases (5, 6, 11). Apparently, the failure in the past to report transmissibility of a virus was sufficient grounds for omission from these compilations even though virus-like symptoms of *Amaryllis* were frequently observed.

A virus, not associated with the mosaic symptoms, has been isolated from *Amaryllis* (3, 10). This virus, known as the tomato spotted wilt virus, is transmitted by sap-transfer and by thrips.

## METHODS AND MATERIALS

*Virus source plants.* The amaryllid source plants, i.e. plants with virus-like symptoms, from which leaves were detached for virus assay or indexing are listed in Table 1.

Table 1. Sources of Amaryllids with virus-like symptoms used in virus transmission tests.

| Accession number | Genus and species | Collector | Location |
|---|---|---|---|
| 700-705 | **Amaryllis** hybrid | Eugene Griffith | Takoma Park, Md. |
| 706-709 | **Amaryllis** hybrid | William Preston | Glenn Dale, Md. |
| 710-716 | **Amaryllis** hybrid | Eugene Griffith | Takoma Park, Md. |
| 717-720 | **Amaryllis** hybrid | Curtis May | Beltsville, Md. |
| 783 | **Amaryllis evansiae** Traub & Nelson | Ira Nelson | Lafayette, La. |
| 785 | **Amaryllis** hybrid (detached leaves) | R. G. Greenler | Waukesha, Wis. |
| 786-787 | **Crinum macowanii** Baker, seedlings | H. P. Traub | La Jolla, Calif. |
| 796-797 | **Amaryllis** sp. (received as **Hippeastrum velutinum**) | Longwood Gardens | Kennett Square, Pa. |
| 802 | **Nerine flexuosa** (Jacq.) Herb. var. **alba** | Leo Brewer | Orinda, Calif. |
| 803 | **Narcissus** clone 'Grapefruit' | Leo Brewer | Orinda, Calif. |
| 804 | **Lycoris incarnata** comes ex Sprenger | Leo Brewer | Orinda, Calif. |
| 805 | **Brunsvigia rosea** (Lam.) Hann. var. **pallida)** | Leo Brewer | Orinda, Calif. |
| 807-809 | **Amaryllis** hybrid | A. H. Grubbs | Richland, Wash. |
| 810-815 | **Amaryllis** hybrids | P. N. Musgrave | Huntington, W. Va. |

*Indicator plants.* Indicator plants, which are known by extensive testing to produce conspicuous symptoms when inoculated with a particular virus, were as follows: (1) *Amaryllis belladonna* L. seedlings or *Amaryllis* hybrid seedlings; (2) tobacco, *Nicotiana tabacum* L. 'Ky 35' 'Samsun'; (3) wild tobacco, *N. glutinosa* L.; (4) Jimson weed, *Datura stramonium* L.; (5) cowpea, *Vigna sinensis* (Torner) Savi 'Black'; (6) *Chenopodium amaranticolor* Coste & Reyn.; and (7) beans, *Phaseolus vulgaris* L. 'Pinto' and 'Refugee.' These indicators were utilized to ascertain whether the source plants were infected with a transmissible virus.

*Greenhouse facilities.* All source plants and indicator plants were grown in a greenhouse (Vegetables and Ornamentals Research Branch, Crops Research Division, U. S. Department of Agriculture) at Beltsville, Maryland. The greenhouse was heated in the winter (60 to 75°F) and cooled in the summer (usually less than 80-85°F). Plants were grown in a compost-soil mixture and fertilized with a complete soluble fertilizer when necessary. The greenhouse was fumigated once each week, usually with Parathion.

*Mechanical transmission.* Mechanical- or sap-transmission tests were conducted by standard virological procedures. Leaves from source plants were ground with a pestle in a mortar containing 1 percent potassium phosphate ($K_2HPO_4$) solution. The juice was then expressed through cheese cloth and then rubbed with cheese cloth pads on leaves of indicator plants which had been previously dusted with 600 mesh Carborundum. (Carborundum is believed to facilitate infection by providing microscopic wounds through which viruses enter plant cells). After inoculation, the plants were rinsed with water to remove excess plant juices that might cause direct injury.

*Insect transmission.* Insect transmission tests were conducted in the greenhouses of the Entomology Research Division, U. S. Department of Agriculture, Beltsville, Maryland. Approximately 25 non-viruliferous green peach aphids, *Myzus persicae* (Sulz.) (reared on collards) were starved for 2 hours and then placed in a small cage on an *Amaryllis* leaf showing virus-like symptoms. After a 10-minute feeding period on these leaves, the aphids were transferred with a camel's hair brush to indicator plants and allowed to feed for 30 minutes. Then the aphids were killed by immersing the indicator plants in nicotine sulfate. Finally, the indicator plants were returned to the greenhouse and observed for symptoms.

## RESULTS

*Transmission of a virus from Amaryllis.* We have transmitted virus from amaryllid source plants to healthy *Amaryllis* seedlings, and also from amaryllids to tobacco and then to healthy *Amaryllis* seedlings by sap and aphid transmission. To our knowledge, this paper constitutes the first report of transmission from diseased *Amaryllis* to healthy *Amaryllis* of a virus that will incite *Amaryllis* mosaic symptoms.

*Sap transmission.* Symptoms were produced on virus-free Samsun tobacco plants and *Amaryllis* seedlings whose leaves were rubbed with the juice from amaryllid source plants that showed typical mosaic symptoms ranging from mild to severe. These tests, which were replicated 2 to 4 times for each source plant during 1960 and 1961, demonstrated that a virus was present. We have transmitted this virus from each of the following sources as listed in Table 1: 700-711, 713-720, 783 (Figure 26), 785, 799, and 807-809. In addition, we have transmitted virus from 802, 805, and 810 to tobacco but have not yet tested these sources on *Amaryllis*. We have not yet transmitted virus to *Amaryllis* seedlings on tobacco from the following source plants: 712, 786 (Figure 26), 787, 796, 797, 803, 804, and 811-815. However, we are in the process of repeating these tests.

*Aphid transmission.* A virus was transmitted by green peach aphids, *Myzus persicae,* from amaryllid or tobacco source plants to healthy tobacco *Amaryllis* seedlings. We have obtained aphid transmission from the following amaryllid source plants: 705, 713, 714, 716, 786, and 809. In addition, virus transmission occurred from source plants 703, 713, 714, 715 and 719 when the virus in amaryllid source plants was first transferred to tobacco by sap transfer methods and then the tobacco used as a source plant for aphid transmission tests. The other amaryllid source plants have not yet been tested by aphid transmission.

*Seed transmission.* The virus apparently was not transmitted through the seed to any of approximately 2000 *Amaryllis* seedlings grown from seed harvested from plants known to be virus-infected. None of the seedlings developed symptoms at the end of 2 to 2½ years

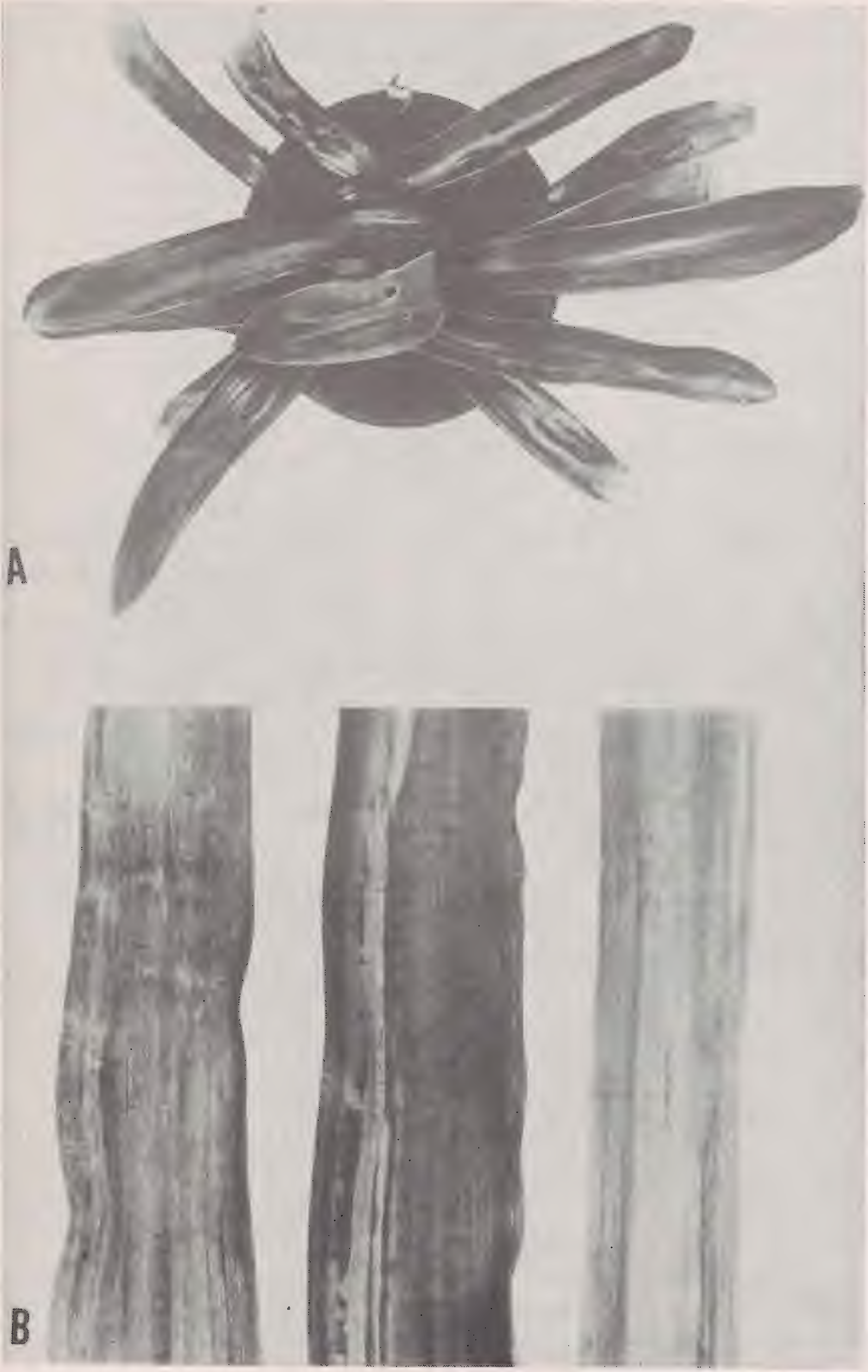

Fig. 26. A. *Amaryllis evansiae* showing typical mosaic symptoms. A virus was isolated from this plant that would incite symptoms on *Amaryllis* seedlings but not on tobacco. B. Detached leaves from *Crinum macowanii* showing virus-like symptoms. A virus has not yet been isolated from this source plant but the tests are currently being repeated.

under greenhouse conditions. To determine whether any latent strains of the virus might be present in a random sampling of symptomless seedlings, we used 20 symptomless seedlings as source plants in sap transfer tests. However, virus was not transmitted from the symptomless seedlings.

These tests, under controlled experimental conditions, demonstrate that the virus is apparently not seed-borne, and confirm reports in the literature (2, 7, 12) and experience of *Amaryllis* growers.

*Identification of the Virus.* The virus which was transmitted by sap transfer and by aphids was identified as the Cucumber mosaic virus (CMV) (*Marmor cucumeris* H). This identification was based on symptomology, thermal inactivation, dilution-end point, longevity *in vitro* determinations, and on the methods of transmission.

As far as symptoms are concerned, the amaryllis virus isolates that could be maintained in tobacco (701, 703, 713, 714, 715, 719, 785, 802, 805, 810) all incited the same symptoms as 3 type cultures of CMV, (CMV-Y strain; CMV-1, Doolittle strain; and CMV-6, Price's indicator strain) on the following indicators:

*Datura stramonium*—mottle
Cowpea, primary leaves—pin-point reddish-brown necrotic local lesions.
'Samsun' and 'Ky 35' tobacco—vein-banding without necrosis on inoculated leaves followed by mosaic on newly formed leaves, occasionally white necrotic rings.
*Nicotiana glutinosa*—mosaic without necrosis
*Chenopodium amaranticolor*—systemic chloritic spotting
Beans—no symptoms
*Amaryllis* seedlings—mosaic or occasionally concentric chlorotic rings or line patterns followed by mosaic.

The *Amaryllis* isolates and known CMV cultures have similar characteristics as follows: (1) thermal-inactivation point (temperature which inactivates the virus during a 10-minute exposure of sap from infected plants in test-tubes immersed in a controlled temperature water bath), (2) dilution end-point (the greatest dilution of sap that will still retain infectivity), and (3) longevity *in vitro* (longest time period that the virus in plant sap remains infectious when stored at room temperature). The thermal inactivation point was between 60 and 65°C, the dilution end-point was in excess of 1:100,000 (1 volume of sap from infected plants in 100,000 volumes of water), and the longevity at room temperature (about 20°C) was 3 to 4 days.

The final characteristic upon which the identification of the virus was based was that both the *Amaryllis* isolates and known CMV isolates are sap- and aphid-transmitted. CMV has been reported by other investigators to be transmitted by several other species of aphids (11).

*Symptoms.* As we have pointed out, "observation" of virus-like symptoms does not constitute proof of virus infection. Nevertheless, most amaryllid growers do not have facilities to conduct sap-transfer or aphid-transmission tests to determine whether the symptoms in his plants are of virus origin. Consequently, the amaryllid grower must rely on visual observation. In doing so he may condemn plants with virus-like symptoms that may not actually be infected.

We have photographed *Amaryllis* mosaic symptoms from some amaryllid source plants listed in Table 1 (Figure 27). We have also photographed symptoms from healthy plants infected with the *Amaryllis* isolates and known sources of cucumber mosaic virus (Figure 28).

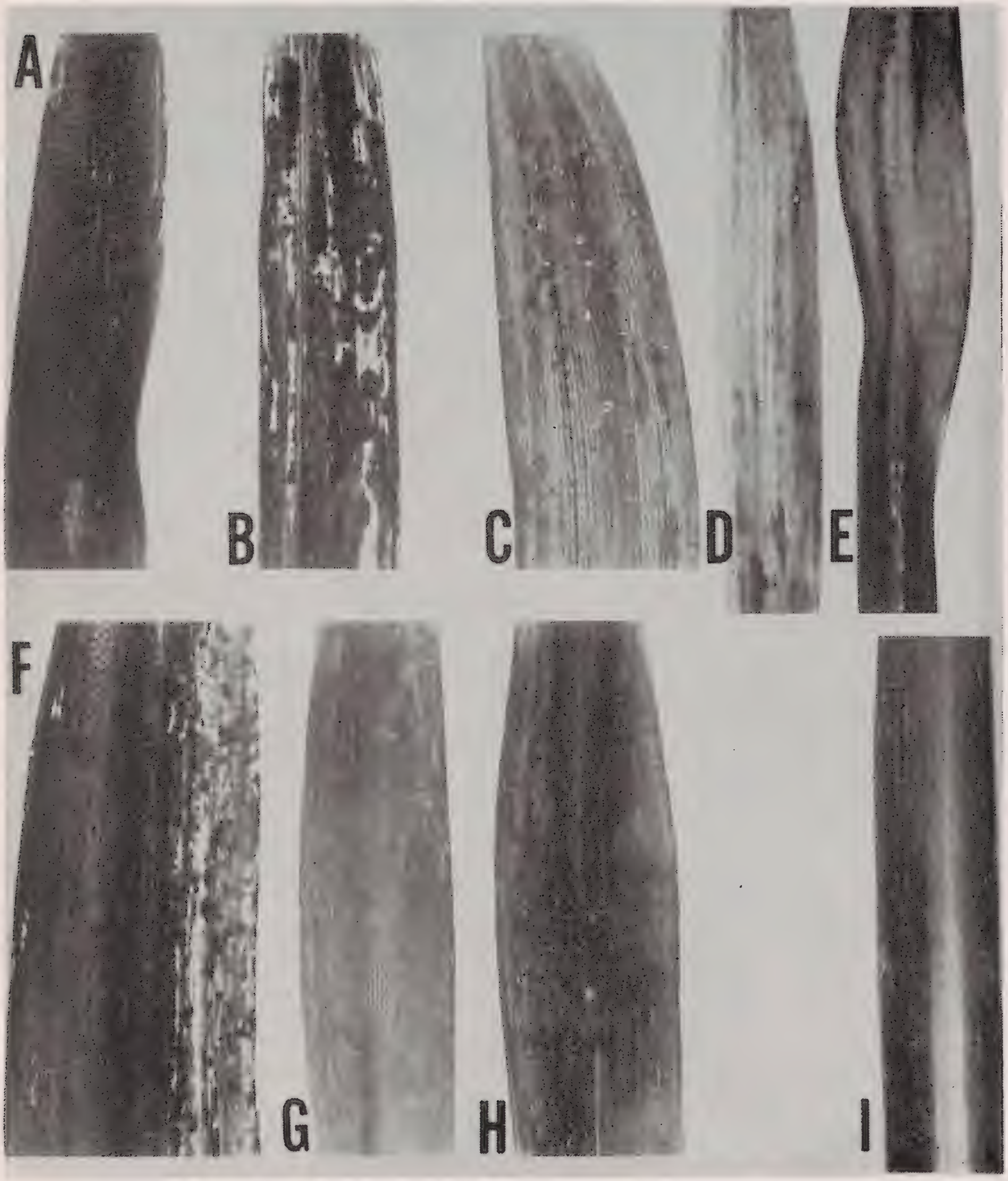

Fig. 27. A-H. Leaves from naturally infected *Amaryllis* source plants showing typical symptoms of Amaryllis mosaic. A virus was transmitted from each of these symptom types to *Amaryllis* and tobacco seedlings. I. Leaf from comparable healthy *Amaryllis* plant.

Amaryllis mosaic symptoms are characterized by light and dark green areas which may be scattered irregularly over the leaf. These

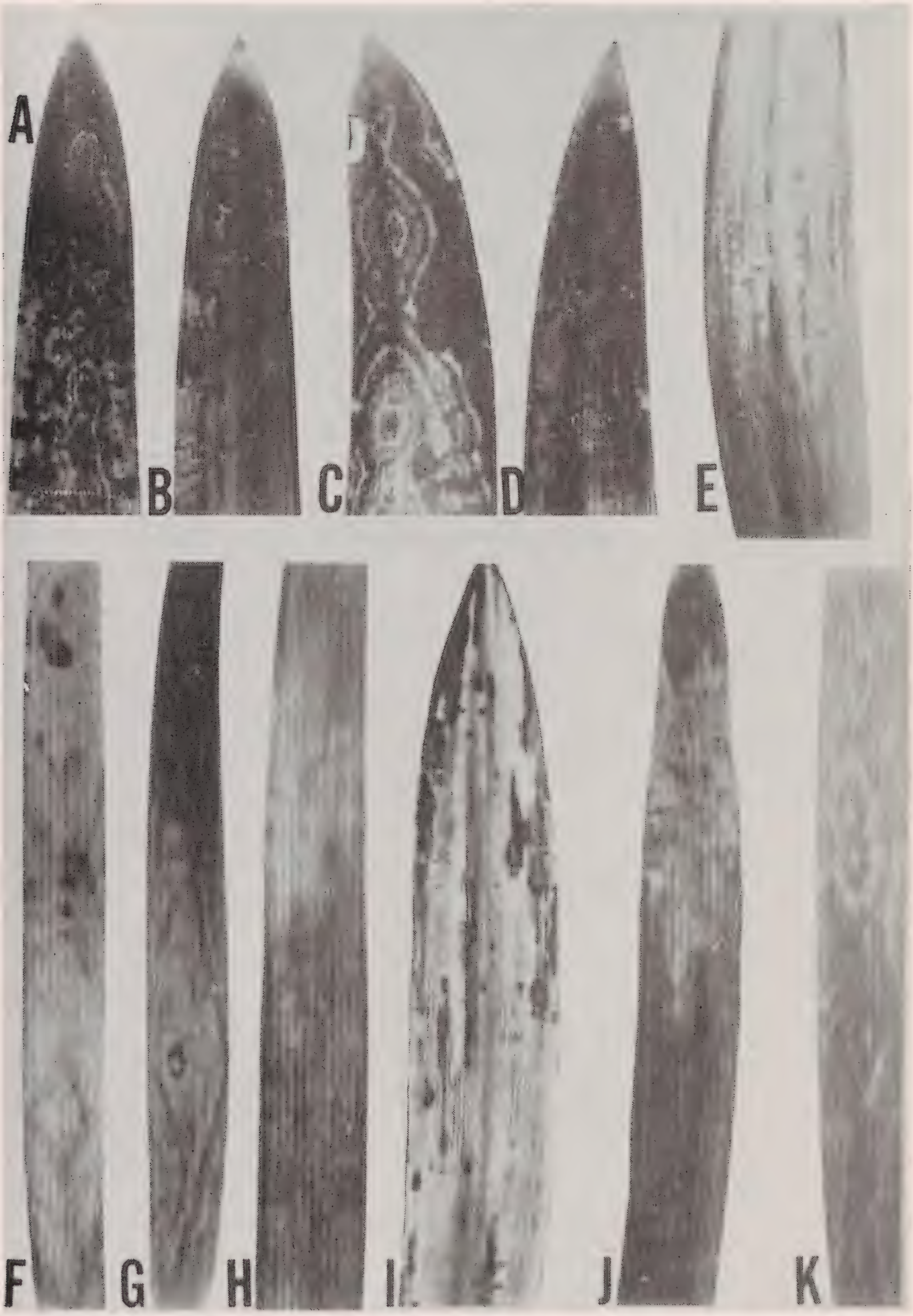

Fig. 28. A-K. Leaves from artificially infected *Amaryllis* indicator plants showing typical symptoms incited by amaryllid virus isolates and known cultures of cucumber mosaic virus as a result of aphid or sap-transmission inoculations. A, C, G, K. concentric chlorotic rings or diamonds observed on inoculated plants but not yet observed on naturally infected plants.

discolored areas may also consist of large patches of yellow-green, white, or pale-green stripes. In addition, when virus is inoculated into healthy *Amaryllis* seedlings, chlorotic concentric rings or diamonds, line pattern or "chevron" striping may be observed. In contrast, symptoms incited by the tomato spotted wilt virus (2, 3) consist of numerous yellow or white spots in association with necrotic or red spots on the leaves. These lesions may remain solitary or coalesce to form irregular areas scattered over the leaf. The leaves may turn yellow and die as a consequence of infection by the tomato spotted wilt virus.

We do not have photographs of symptoms that are known to be induced by nutritional deficiencies or excesses. However, since our source plants and indicators were grown under optimal conditions with respect to light, temperature, watering, soil and fertilizer, we are certain that symptoms shown here are not of physiologic origin. None of our non-inoculated *Amaryllis* control plants ever showed any type of symptom during the 3-year period in which we conducted our tests.

We are not in a position, on the basis of our experimental studies, to conclude that nutritional imbalance might not result in symptoms in some other *Amaryllis* plantings which would be similar to those we have presented for virus-induced symptoms. However, we are of the opinion that nutritional imbalance symptoms would be more likely to be expressed as general chlorosis, or as necrosis, reddening and chlorosis along tips, margins, or veins.

Similarly, we can not say that the symptoms which we have pictured may not, in some other plants, also be induced by a genetic factor. However, none of our non-inoculated seedlings (almost 2000) developed such symptoms.

Therefore, we are concluding that the photographs in this paper show symptoms of naturally infected plants from which a virus has been isolated or of plants artificially infected with *Amaryllis* virus or known cucumber mosaic virus isolates.

We are not in a position to state that *all* plants which produce symptoms similar to those we have photographed are virus-infected. However, it is our opinion that there is little likelihood that these symptoms are induced by nutritional or genetic factors. Consequently, for practical purposes in controlling the disease, we would advise amaryllid growers to consider all symptoms similar to those shown in the photographs as virus-induced.

*Recommendations for Control.* Control of virus diseases is generally directed towards preventing infection rather than curing a plant already infected. Chemicals that have been tested so far which would inactivate a virus already established in a plant have also been detrimental to the plant. Heat treatments (growing plants at 100-102° F for 30 to 90 days) have been effective for such plants as citrus, rose, chrysanthemum, and carnation in providing an environment where the virus does not keep pace with the growing point. Consequently, virus-free tip cuttings may be propagated. However, the heat treatment does not cure the mother plant.

Since effective control measures must be based on preventing infection, they should be geared to preventing transmission from infected to healthy plants. We now know that a virus which incites *Amaryllis* mosaic is spread by sap transfer and by aphids.

Although we have used the sap transfer method experiment to prove the infectious nature of the causal agent, the amaryllid grower may unintentionally transmit virus by this method on his cutting implements. Sap-transmissible viruses are often spread on cutting knives if the virus attains a high concentration in the plant sap. We have not attempted to demonstrate transmission of an *Amaryllis* mosaic virus by knives or other implements. However, experience with other sap-transmissible viruses leads us to concur in the recommendations of Traub (12) for the sterilization of knives used in propagation by bulb cuttage, especially that such implements be sterilized if they have been used on bulbs with symptoms before use on symptomless plants. Sterilizing could be accomplished by any of the following methods: (1) dip the implements in alcohol and flame, (2) boil them for 5 minutes, (3) dip them in washing soda, trisodium phosphate, or in electric dishwashing compound and rinse in water (use of rubber gloves recommended), or (4) wash them in strong soap.

Destruction of infected plants has been recommended as the principal control measure (2, 7, 12). We would strongly concur with this recommendation since infected plants serve as a source of inoculum for spread by the aphid vector. Commercial growers should carefully rogue infected plants to prevent dissemination of virus in bulbs sold to the public. If *Amaryllis* collectors possess infected plants too valuable to destroy, these plants should be isolated from other amaryllids.

*Amaryllis* collectors who already have expensive virus-free collections should isolate new acquisitions for a period of at least one growing season to ascertain virus infection and to avoid contamination.

In addition to sterilization of implements and roguing, we would recommend application of insecticides (9) in field and greenhouse plantings. In the field, however, we would not expect that infection could be prevented because it would not be economically practical to apply insecticidal deposit. However, frequent applications would tend to keep down the aphid population. In a properly screened greenhouse we would recommend regular application of insecticide since aphid control in the greenhouse is feasible.

The following control measures are recommended:

### *In the greenhouse:*

(1) Install screens (20-mesh or finer) on all vents and doors.

(2) Spray or fumigate (9) regularly to control greenhouse insects (especially aphids and thrips).

(3) Isolate valuable infected plants in fine-mesh cages in the greenhouse or isolate them outdoors.

(4) Remove all inexpensive plants showing virus-like symptoms.

(5) Keep amaryllids outdoors (whether they are symptomless or not) if they have been growing outdoors near vegetables or weeds rather than move any into a greenhouse containing symptomless amaryllids.

(6) Propagate from infected plants by seeds rather than cuttings if progeny will come true from seed.

(7) Isolate new acquisitions until the foliage can be examined for symptoms if a virus-free amaryllid collection has been established in a greenhouse.

(8) Plant resistant species or hybrids if these are available.

(9) Ramets of vegetatively propagated clones should be widely distributed to insure against possible loss by total infection of all stock (a recommendation by Dr. Traub to which the authors subscribe).

### *In the field or garden:*

(1) Destroy all members of the Amaryllidaceae with virus-like symptoms if cost of plants is not a factor. Isolate from other symptomless amaryllids all infected plants that are too valuable to destroy.

(2) Keep weeds under control and destroy *any* cultivated or wild plants showing virus-like symptoms as a general phytosanitary practice.

(3) Apply insecticides to amaryllids as often as practical with a variety of insecticides (9) if insecticides are applied as a routine practice in the field or garden. These insecticide applications will tend to reduce insect populations but cannot be expected to eliminate virus-vectors.

(4) Grow resistant species or hybrids if available.

Cucumber mosaic virus is one of the most difficult viruses to control under field conditions since there are over 200 known hosts and 48 species of aphid vectors. Reservoir plants from which the aphids could transmit virus to amaryllids include weeds, ornamentals and vegetables.

## DISCUSSION

We have established that cucumber mosaic virus can be isolated from *Amaryllis* and transmitted back to healthy *Amaryllis* by sap transfer and aphid transmission methods. We wish to emphasize that this identification refers to those amaryllid isolates which we can maintain in tobacco. (Sources 701, 703, 713, 714, 715, 719, 785, 802, 805, 810).

More than one virus may be associated with the *Amaryllis* mosaic disease. Evidence supporting this hypothesis is that we do have some source plants that yield virus which we can transmit only from amaryllids to *Amaryllis,* whereas we have other source plants from which we can isolate a virus that will infect tobacco as well as *Amaryllis;* yet, all source plants show typical *Amaryllis* mosaic symptoms. In addition, some isolates will incite concentric ring and line pattern symptoms as well as mosaic symptoms, whereas other isolates incite only mosaic symptoms. We are currently engaged in research to elucidate this problem.

## LITERATURE CITED

1. Anderson, C. W. 1959. A study of field sources and spread of five viruses of peppers in Central Florida. Phytopath. 49:97-101.

2. Brierley, P. R. 1948. Diseases of the Amaryllidaceae excluding those of Allium and Narcissus. Herbertia 15:113-120.

3. Gardener, M. W., C. M. Thompkins, and O. C. Whipple. 1935. Spotted wilt of truck and ornamental plants. Phytopath. 25:17.

4. Hannibal, L. S. 1942. Mosaic virus in the Amaryllids. Herbertia 9:149-150.

5. Holmes, F. O. 1948. The Filterable Virus. Supplement No. 2, Bergey's Manual of Determinative Bacteriology. Ed. VI. The Williams & Wilkins Company, Baltimore.

6. Hopkins, J. C. F., Editor. 1957. Common names of virus diseases used in the Review of Applied Mycology. Supplement, August 1957. Volume 35, R. A. M.

7. Kahn, R. P. 1960. The Present Status of the Amaryllis Mosaic Disease in the United States. Louisiana Society for Horticultural Research. Bulletin No. 5, pp. 24-30.

8. Kahn, R. P., H. L. Scott, and R. L. Monroe. The Eucharis Mottle Strain of tobacco ringspot virus. Phytopathology (In Press).

9. Smith, F. F. 1962. Controlling Insects on Flowers. Agriculture Information Bulletin No. 237. U. S. Dept. of Agriculture. 80 pp.

10. Smith, K. M. 1935. Diseases of ornamental plants caused by the tomato spotted wilt virus. Jour. Roy. Hort. Soc. 60:304-310.

11. Smith, K. M. 1957. A textbook of Plant Virus Diseases, 2nd Ed. Little, Brown & Co., Boston.

12. Traub, H. P. 1958. The Amaryllis Manual. The Macmillan Co., N. Y.

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## MOSAIC IN AMARYLLIS CALYPTRATA

W. QUINN BUCK, *Los Angeles State and County Arboretum, Arcadia, California*

The bulbs of *Amaryllis calyptrata* which were described in the 1962 Amaryllis Year Book, PLANT LIFE, Vol. 18, during the whole year of 1962 produced flower spikes at intervals. Some of the bulbs had as many as three and four spikes. The most important development in their history, however, has been the appearance of mosaic.

These fine species bulbs were benched alongside a large group of imported hybrid *Amaryllis,* all of which showed marked mosaic patterns in the foliage, but with no reduction in vigor of growth or quality of flowering. Along in the year the *Amaryllis calyptrata* plants nearest these imported hybrids began showing typical mosaic symptoms in the leaves, and after a few months their vigor was so markedly reduced (Fig. 29) that it seemed wiser to discard them, rather than risk infecting the remaining healthy stock. The root systems of some of the discarded bulbs appeared to be in fine shape, whereas part of the bulbs had few roots left.

Hereafter it will be necessary to keep a close watch on this species, as it would seem that mosaic, which apparently does not harm some hybrids, does damage *Amaryllis calyptrata* drastically.

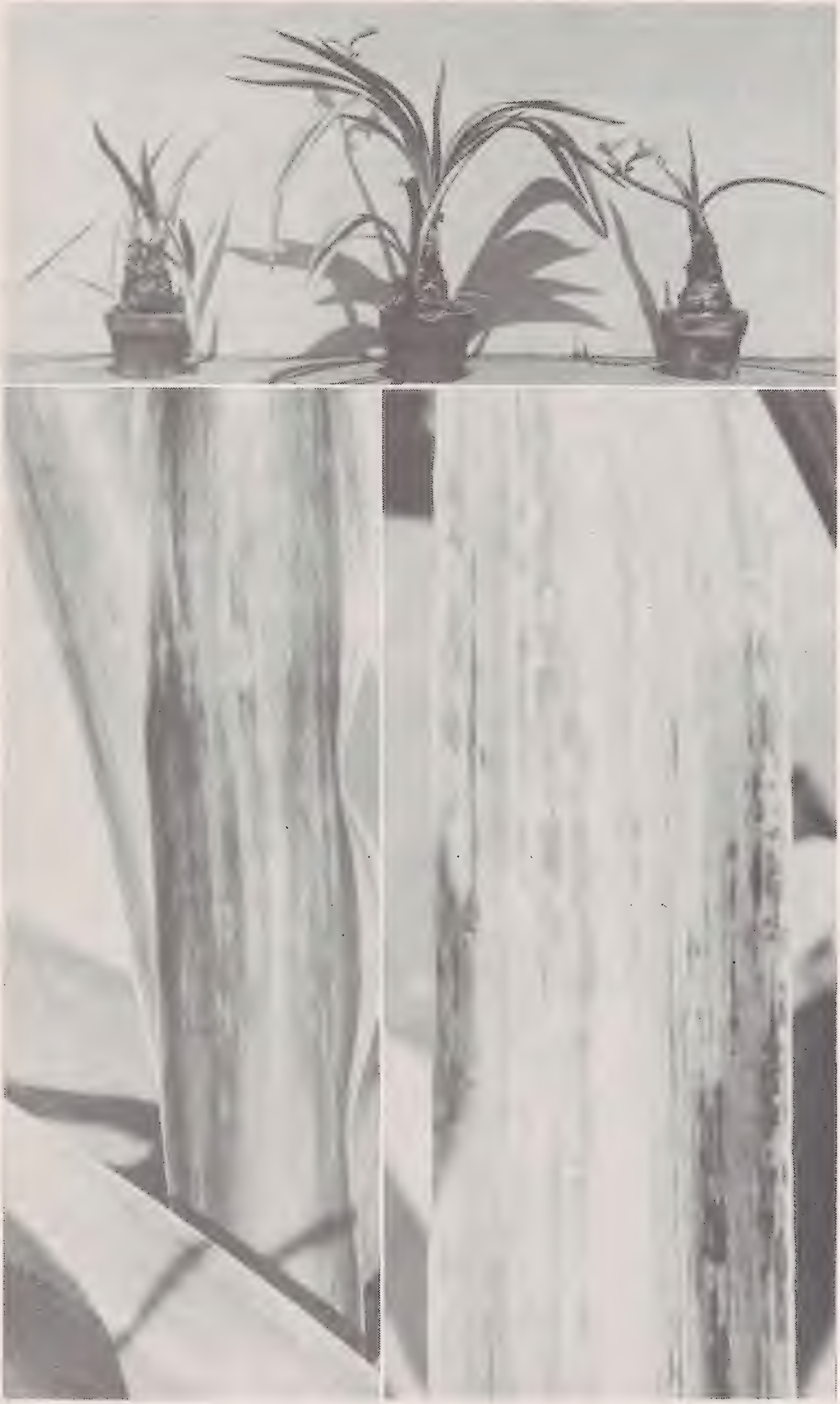

Fig. 29. Upper, showing weakened bulbs of *Amaryllis calyptrata* due to Amaryllis mosaic on each side of a healthy, normal bulb.

Lower left, and right, showing Amaryllis mosaic patterns on the leaves of *Amaryllis calyptrata*. Photos by Jack V. McCaskill.

# GROWING AMARYLLIS CLONE 'MRS. GARFIELD'

BURR CLOUETTE, *California*

Most amaryllisarians who have attempted to grow hybrid *Amaryllis* clone 'Mrs. Garfield' report that they have difficulty in getting it to grow properly. When I moved to San Diego, Calif., in Sept. 1961 from Salinas, Calif., I brought my one bulb of 'Mrs. Garfield' with me. This bulb was among those imported from India by Mr. Goedert, and had been grown at Salinas since Dec. 1960. The pot was placed in a sunny south window which was covered with a piece of plastic thus cutting down the light somewhat. It had only one leaf which soon withered and the bulb was leafless for some weeks, when new growth started. Soon there were three bright green white-banded leaves. Some mottling apparently due to mosaic was noted. Then two more leaves were formed, and an offset started to grow. The oldest leaf died, leaving three on one side, and one on the other.

While cleaning the window one day, the pot containing the plant was set in full sun. It was forgotten and it was left out for most of the day. The result was that the leaves of 'Mrs. Garfield' were badly burnt. Two of the leaves died, and one of the remaining leaves showed burning in the middle section. Soon a new leaf on the bulb and offset formed. Now on Sept. 15, 1962, the original bulb and offset each have three leaves. The important lesson from this experience is that 'Mrs. Garfield' needs some shading.

'Mrs. Garfield' seems to be nearly evergreen, and is leafless for only very brief periods of two to three weeks. Apparently the soil has to be kept moist most of the time, and when growth is active it should be given liberal waterings. I have found that growth is stimulated by frequent weak liquid fertilizing.

The bulb has increased in size and it is now over 1¾ inches in diameter, and one offset has been made. Although no flowers have been obtained as yet, the healthy plant which is increasing in size should possibly reward the care given it with flowers in the fall of 1963.

# CONTROL OF AMARYLLIS RED LEAF SPOT

MRS. BERT WILLIAMS, *California*

I have had trouble with mildew and red spot of Amaryllis this season (1962). Experiments with the use of ''Bactine''—used for athlete's foot—has given good results. A bulb imported from Holland was disfigured with red spot. Having nothing else on hand, I soaked it in ''Bactine'' and it is growing nicely now.

# AMARYLLIS ROUND ROBIN NOTES, 1962

MRS. FRED FLICK, *Chairman,*
Amaryllis Round Robins, *Carthage, Indiana*

[The following notes were extracted from Round Robin letters by the Chairman of the Amaryllis Round Robins.—*Editor*]

Lydia Pahls, Miami, Fla.—I had my first look at the *Amaryllis evansiae.* It is lovely!—a small, pale yellow flower, with a nice shape. I left my *Amaryllis striata* with Mr. C., and he gave me some pollen from the *Amaryllis evansiae.* I had one other *A. striata* in bloom, and used the pollen on it. I have about fifteen seedlings of this cross.

Helen Elias, Conn.—The *Crinum* 'Cecil Houdyshel', which was planted out three years ago, came through the past winter (an extremely cold one) very well. There are now two offsets, and they sent up at least a dozen stems of lovely clear pink flowers, up to 36 inches tall, with at least two dozen flowers per stem. It was the conversation piece of our garden this year.

Opal Flick, Carthage, Indiana.—We have purchased twelve acres of land seventy miles from here. It is in a scenic hill section of Indiana. However, we have a four to five acre level area, with fertile, sandy loam. I set all my bulbs of the Amaryllidaceae there this past summer. These included *Amaryllis,* crinums; sprekelias; *Hymenocallis;* pancratiums; and *Zepheranthes.* The land had not been cropped for many years; and we had the weed growth disced in twice. Then I used some 12-12-12 fertilizer broadcast; with some bone meal worked into soil before the bulbs were set out. The growth made in this new soil was amazing; and several of the bulbs bloomed during the summer. On digging the bulbs in the fall, I found that the most of them had started to increase.

My extra special bulbs were planted out here at home. Len Woelfle's hybrid *Hymenocallis* 'Pax' was one of these. It was divided into two bulbs in the spring. Only the mother bulb bloomed. Both bulbs increased in size; and the mother bulb produced another bulb.

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[**PLANT LIFE LIBRARY,** continued from page 68.]

THE COMPLETE GUIDE TO BULBS, by P. M. Synge. E. P. Dutton & Co., 300 Park Av. So., New York 10, N. Y. 1962. Pp. 320. Illus. In this guide (manual) to a selected number of plants with bulbous, cormous, tuberous or rhizomatous rootstocks, the author has condensed a vast amount of information. In an introduction the cultural practices in general are briefly summarized. This is followed by an alphabetical arrangement by genera under which the species and varieties are briefly described and cultural directions indicated. The guide is written from the standpoint of English climatic conditions and due allowances have to be made for the widely varying climates of the United States. It should be noted that in some instances outmoded names are applied to plants—*Hippeastrum* is used for *Amaryllis,* and *Amaryllis* is used for *Brunsvigia.* He includes the species of *Rhodophiala—advena* and *pratensis*—under *Hippeastrum.* He uses *H. rutilum* in place of *Amaryllis striata,* etc. There are 24 black and white, and 32 colored plates, some are not true to nature: for instance, *Sternbergia, Zephyranthes grandiflora, Narcissus serotinus* in plate 32.

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EDITED BY
Hamilton P. Traub
Harold N. Moldenke

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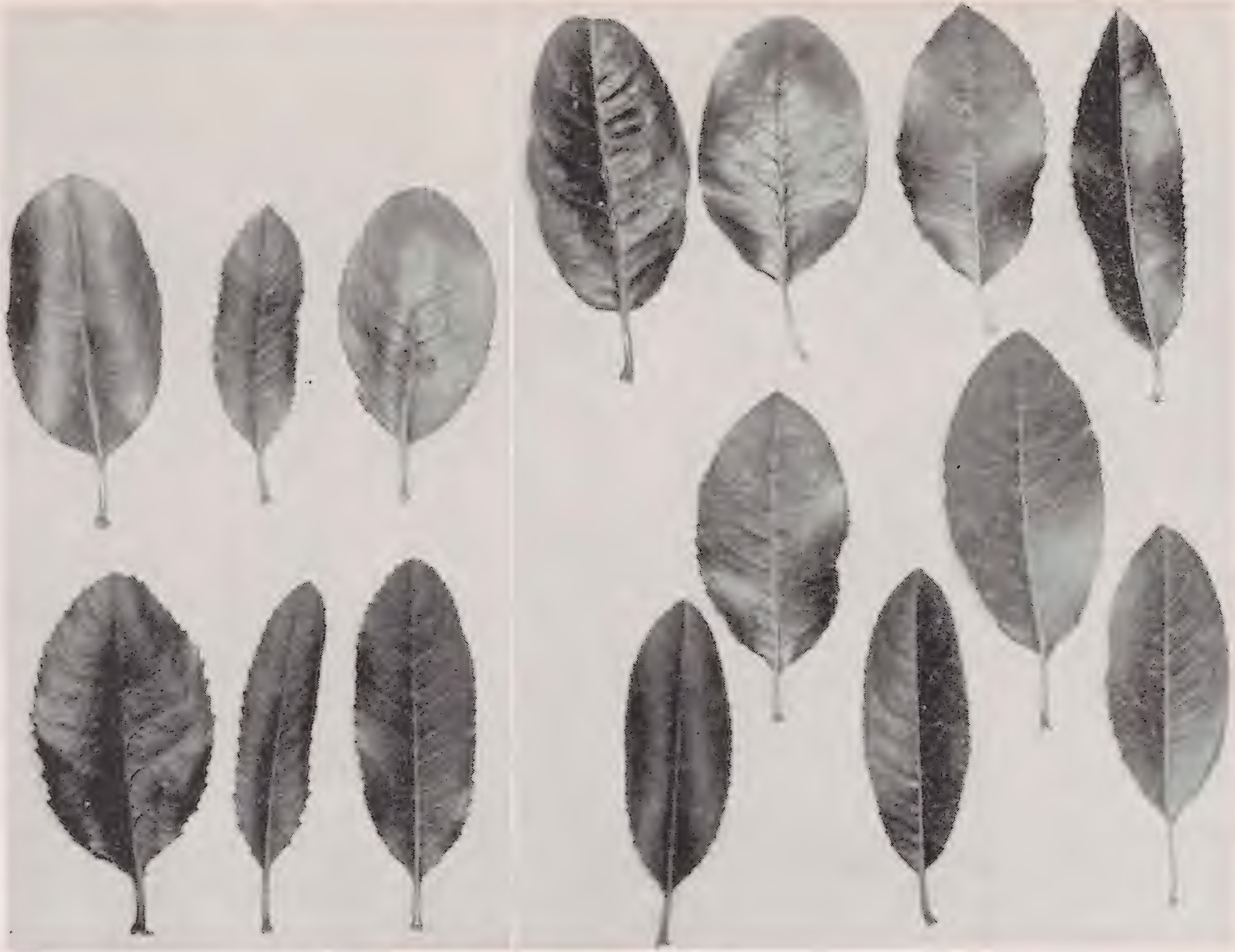

Fig. 30. Leaves of **Photinia arbutifolia** Lindl. Left, from seedlings of **macrocarpa** on quince root. Right,—top row, from three scattered plants growing in the Santa Clara Valley; middle row, from **macrocarpa** plants on quince root; bottom row, from individual multi-cotyledonous plants. NOTE—The two center leaves are from plants producing berries similar to those produced by the plants from which the leaves in the middle row were taken.

# VARIATION IN PHOTINIA ARBUTIFOLIA

W. M. James, *California*

*Photinia arbutifolia,* Lindl. (*Heteromeles arbutifolia* Roem. *H. saliscifolia* Abrams., *Crataegus arbutifolia* Ait. not Lam.) is an attractive, well-known evergreen shrub found only in California and Lower California. It grows below 4000 feet in the Coastal ranges from Humboldt County through Southern California into Mexico and in the Sierra Nevadas from Shasta to Tulare Counties. *P. arbutifolia* var. *macrocarpa* Munz grows only on Santa Catalina and San Clemente Islands off the Southern California Coast. A yellow-berried form, *P. arbutifolia* var. *cerina Jeps.,* is found in San Luis Obispo County. The type was first discovered or noted by Menzies in 1792 near the present site of San Francisco. He considered it a *Crataegus* and introduced it to cultivation in England, where it has been grown sparingly ever since under the name of California Maybush, ''May'' being an English synonym for the Hawthorn.

Extensive casual observation made by the writer for several years indicated a rather uniform shape and serrulation of the leaves on the plants growing on the mainland. Size of leaf can be influenced by varying light and soil conditions. He has never seen the varieties *macrocarpa* and *cerina* growing in their natural habitats. Seeds of *macrocarpa* were received annually from Catalina Island for several years. Leaves accompanying these fruits were always a little shorter, more rounded on the ends, the serrulations not quite so deep, and in general appeared to be about as uniform as those found on the type. The berries on the *macrocarpa* plants are about twice the size of those from the plants on the mainland.

*Photinia arbutifolia* is often difficult to grow in gardens because there is generally more water applied than it requires. Scions from two plants from the San Jose area were grafted on quince root, hoping to get plants that would do better under general garden conditions. These grafts made a good union and several plants sent out for trial have done well, although the quince root has a dwarfing effect. Twigs received with the fruits of *macrocarpa* from Santa Catalina Island also made a good union on the quince root and are growing and fruiting satisfactorily. As the bushes are not very large, this form also probably shows some dwarfing effect from the new root.

In transplanting seedlings of both the island and mainland forms, fifteen to twenty multi-cotyledonous plants per thousand were noted. Most of these had four, a few had three or five, cotyledons. Some of these were isolated to grow on for observation.

Two of these selected plants have produced fruits that outwardly appear to be the same as those from *macrocarpa* and the leaves are also similar. Another plant is very different. In one season it grew three times the height of the two just mentioned. The limbs are very stiff and straight. The leaves are longer, narrower and more sharply serru-

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lated than any the writer has seen. The berries are the same as those of the type, but the cluster is larger and somewhat stiff and open. Seedlings grown from seed produced by the *macrocarpa* form on quince root show some variation in the leaves. The difference shows clearly in Fig. 30.

Cuttings from all forms are being grown and it is hoped to have plants of the entire group on their own roots growing side by side under the same conditions. If the present difference in foliage and berries is still apparent, then an examination for polyploidy might be interesting.

## EASY METHOD FOR ROOTING CUTTINGS

Burr Clouette, *California*

With a little variation, the following method of rooting cuttings may be applied to various types of plant material. The basic materials are some sort of container—pots, or even milk cartons cut in half with drainage holes at the corners; vermiculite; rooting hormone such as ''rootone''; complete soluble or liquid fertilizer, and a little patience.

If half milk cartons are used, these are washed clean, and small triangular holes are made at the corners. They are filled with vermiculite, either grade although the coarser is better, especially for cuttings taking a long time to root. The coarser grade does not pack and become soggy as the finer does in time. Before cuttings are planted, water is applied so that it runs out of the drainage holes freely. It is a good plan to place some gravel in the bottoms of the containers used which prevents the vermiculite from washing out.

The cutting material should be fresh, and the cut is made at the node. The lower leaves are trimmed off, and the lower half inch of the base of the cutting is dipped in rooting powder. With tender subjects, it is worth while to rub the powder on leaf scars also. This will control rotting below the soil line. A hole is made in the vermiculite and the cutting is inserted to about ¼ of its length. The vermiculite is firmed around the cutting. Water is applied lightly by sprinkling so that foliage is wet. The cuttings are set in the shade, and are watered slightly daily by sprinkling to wet the foliage. Material that will take the sun is moved gradually to the proper sun exposure.

Cuttings from such subjects as geraniums and cacti, are set in the shade for a time before planting—geranium cuttings for a day or two, and cacti for as long as two weeks. For most cuttings, it is better to plant at once. For very tender cuttings, and tip or leaf cuttings, a plastic bag is placed over the container. After the cutting stops wilting, holes are cut in the bag for ventilation, and then it is later finally removed.

The advantage of using half milk cartons as containers is the ease of transplanting. The carton is cut open and the rooted cutting is removed for planting.

After the first week, the cuttings should be watered weekly with any soluble or liquid complete houseplant fertilizer, using reduced strength at first. Many cuttings are ready for transplanting in three or four weeks.

# PLANT SCIENCE FOR THE LAYMAN

Nathan William Easterly,
*Bowling Green, State University, Bowling Green, Ohio*

A college freshman would define botany as the study of plants. The more daring ones might amend the definition to read ''pickled plants'', or the study of lifeless colored slides, or even the study of dry hay. The implications here are exaggerated but by how much? More mature students in their junior and senior years realize that botany encompasses all studies of plant life whether it pertains to the pure science or to the applied sciences of medicine, agriculture, forestry and horticulture. Much could be discussed concerning the interrelationships or the lack of interrelationships of these sciences. However, I would like to focus attention on those who should benefit from the study of botany rather than on the subject matter of botany.

There are at least five groups who may take courses in college botany: (1) graduate students and undergraduate majors in biology or botany, (2) undergraduates who take botany as an elective, (3) undergraduates who take botany as a science requirement, (4) returning secondary school teachers who renew their certificates, and (5) interested lay people.

There is no question in my mind concerning the education of the first group. These people are being trained for research activities or a combination of teaching and research. They have very definite goals outlined for themselves and they go where adequate facilities and research opportunities exist. But we still have the remaining four groups left. What do we do for them? Should they be trained along the same lines as the first group? Should not more attention be focused on the avocational possibilities of botany as well as the vocational aspects?

The major word that was left out in the definition of botany by the freshman was *life*. Botany is a living science. If I can show the freshman that living plants make up the farmer's agricultural crops and the relationship of biological phenomena to these crops, I have advanced a long way in making botany a meaningful science course to this student. Going a bit further, if I can show him how living plants can broaden his interests in our day to day living, I have made a contribution in his behalf. This approach should strengthen the objectives of groups (2) and (3).

The secondary school teachers should be given up-to-date scientific information. Since they are working with a younger generation, these teachers also need to know the practical applications or even the aesthetic qualities of botany. To give them the impression that botany is a pure science devoted only to scholarly research activity is deadly.

The last group of people represent somewhat of an anomaly according to some of the scientific personnel. They are much interested in living plants. Yet, they are led to believe that botany and horticulture do not mix. One of the most significant contributions botanical educators could make would be to correct this false notion. Many botanists bristle at the term "popular botany". The science of botany ceases to be a science. This need not be the case if the instructors have been thoroughly trained in plant science.

The study of herbarium specimens, of prepared slides and even adequately preserved specimens is essential but often the love of living plant life and how plants live among their cohorts is overlooked in basic botany courses. The above remarks should not be construed to be derogatory. The need for more research is evident. The need for more educational activity on all levels should be just as evident. Even in the first group of people, i.e. the trained scientist, the broadest training in botany is needed to give them an understanding of their student's needs. For the remaining four groups of people, the study of botany, or plant science, as an avocation should broaden and enrich their existence.

## PLANT LIFE LIBRARY

SEED PRESERVATION AND LONGEVITY by Lela V. Barton, John Wiley & Sons, Interscience Division, 440 Park Av., South, New York 16, N. Y. 1962. pp. 216. $9.50. Illus. Individuals curious about the facts concerning the perennially recurring story of Egyptian mummy wheat, or the reported extreme longevity of lotus seeds can find authoritative answers to their questions in SEED PRESERVATION AND LONGEVITY. Dr. Lela V. Barton of the Boyce Thompson Institute for Plant Research has brought together an enormous quantity of documented information about seeds in this book. She is probably one of the best qualified persons in the country, if not in the world, to author a book on seeds. The Bibliography indicates that Dr. Barton published a paper on seeds as long ago as 1930, and a continuous flow of published material about seeds has issued from her experimental work since that time.

The book has evidently been designed as a reference and text, particularly for seed technologists, seedsmen, and others connected with the seed industry. The subject matter is so important, however, that the book should be attractive to agronomists, horticulturists, foresters, and those who work in other applied fields of botanical science.

Besides chapters on "Records of old seeds", "Life-span of seeds buried in the soil", "Moisture effects", and "Other factors affecting longevity", there are separate chapters on the longevity of the economically important classes of seeds such as vegetable, flower, field, tree, etc. Two interesting and significant chapters on "Methods of testing for viability" are followed by chapters with the titles "Plants from old seeds" and "Causes of deterioration". There is a final chapter on "Practical considerations".

A glossary of just over 130 terms will be useful to those unacquainted with the technical jargon of seed technology. Accurate indexes, both subject and author, add to the book's reference value. Slightly more than 31 pages are devoted to a Bibliography of about 850 citations. In spite of its length there are some surprising omissions in the Bibliography; for example, the valuable reference work, VEGETABLE AND FLOWER SEED PRODUCTION by Hawthorne and Pollard is not cited. There are 22 tables, 13 plates, and 13 text figures. The plates are well reproduced, but the legends for some plates seem a little cumbersome.

The reviewer has noted a few typographical errors, but there are almost inevitable in the production of any book. The writing tends to be pedestrian, but this is to be expected, since present knowledge about seeds is not easily phrased in sprightly language. SEED PRESERVATION AND LONGEVITY should be required reading for anyone even remotely connected with the seed industry. Furthermore, those biologists who are occasionally troubled with problems relating to seeds, could well afford to have this book on their reference shelf.—*Thomas W. Whitaker.*

PLANT TAXONOMY: METHODS AND PRINCIPLES, by Lyman Benson. Ronald Press, 15 E. 26th St., New York 10, N. Y. 1962. Pp. 494. Illus. $11.50. Dr. Benson is to be commended for his evolutionary approach to the subject of taxonomy which is in harmony with the best work in this field now being carried on. In addition he does not neglect nomenclature, and the presentation of the data obtained. The book is in five parts: (1) exploration for data, including data from various fields; (2) classification—principles, and the higher categories; (3) choice of names; (4) description and documentation, and (5) treatises and monographs. This stimulating text is highly recommended.—*H. P. Traub.*

PLANT LIFE IN PALESTINE: ISRAEL AND JORDAN, by M. Zohary. Ronald Press, 15 E. 26th St., New York 10, N. Y. 1962. Pp. 262. Illus. $8.00. This book by *the* authority on the subject is a welcome addition to the other important texts which he has produced in the past. After considering the topography, soil, climate and plant life of the region, he discusses the structure and development of the vegetation classes, and the biogeographical areas, and the continuing influence by man on the structure of the vegetation. This outstanding book is highly recommended.

REGENERATION, edited by D. Rudnick. Ronald Press, 15 E. 26th St., New York 10, N. Y. 1962. Pp. 272. Illus. $9.00. The discussions in this symposium by eight authorities deal with new and special aspects of the subject: (chapters 1—3) regeneration in invertebrates—sponges, hydra and flatworms; (chapters 4—5) regeneration in plants stimulated by tumor producing agents, and by excision and culture of parts; (chapters 6—8) application of new methods to the study of the amphibian eye. This stimulating book is highly recommended.

THE FLOWER ARRANGEMENT CALENDAR, 1963, by Helen Van Pelt Wilson. M. Burrows & Co., 425 Park Av. So., New York 16, N. Y. 1962. Illus. The publishers sponsor an annual flower arrangement calendar contest. In this little book some of the outstanding photographs of floral arrangements accepted by the publishers are reproduced in calendar form for 1963. The Calendar will be useful to those interested in flower arranging.

A BOOK ABOUT SOILS FOR THE HOME GARDENER, by H. S. Ortloff and H. B. Raymore. M. Barrows & Co., 425 Park Av. So., New York 16, N. Y. 1962. Pp. 189. $3.95. This popular treatise is in two parts: (1) the nature of soils—how formed, physical properties, composition, habitability, chemical fitness, fertilizers, acidity, soil organisms, and how plants grow; (2) soil management—appraisal and evaluation, supplying water, excess water, tillage and cultivation, tools, soil distribution by geographical regions.

BIOLOGY: ITS PRINCIPLES AND IMPLICATIONS, by Garrett Hardin. W. H. Freeman & Co., 660 Market St., San Francisco 4, Calif. 1961. Pp. 682. Illus. in two colors. $8.00. This attractive text by an outstanding authority will be welcomed by the student. The book is in four parts: (1) introductory principles —the ways of science, cells and cell division, the molecular world of cells, chemical basis of life; cybernetic equilibria, mechanisms of evolution and mutations; (2) our plant dependent world—autotrophs and heterotrophs; (3) animals, including man; and (4) heredity and nature and origin of life. This is a stimulating book such as only Dr. Hardin can produce. It is highly recommended.

BOTANICAL HISTOCHEMISTRY: PRINCIPLES AND PRACTICE, by W. A. Jensen. W. H. Freeman & Co., 660 Market St., San Francisco 4, Calif. 1962. Pp. 408. Illus. $10.00. The purpose of this important book is to present about 200 histochemical procedures, and to give examples for their use in the investigation of botanical problems. The text is in four parts: (1) general considerations—quantitative and microscopic histochemistry; (2) preparation of the tissue; (3) tissue and cell analysis; and (4) histochemical techniques. This excellent new text fills a definite need, and is highly recommended.

LIFE BEYOND OUR PLANET, by D. Q. Posin. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. 1962. Pp. 128. Illus. $3.25. The author believes that intelligent beings have evolved not only on earth but also on other planets, and he offers what he considers as compelling arguments in support of his viewpoint. This fascinating book stimulates the imagination and will appeal to all —teenagers and adults.

LIFE: ITS NATURE, ORIGIN AND DEVELOPMENT, by A. I. Oparin (trans. by Ann Synge). Academic Press, 111 Fifth Av., New York 3, N. Y. 1962. Pp. 207. Illus. $4.50. An outstanding authority in this field points out that the problem of the origin of life, formerly considered on the metaphysical basis, and the problem of the essential nature of life, are really one. This book is an attempt to consider the subject from this unitary approach: (1) the nature of life; (2) the origin of life; (3) the earliest period of the development of life; (4) the further evaluation of life, and (5) conclusions. This book will be read by all who are interested in the nature and origin of life.

ADVANCES IN AGRONOMY, Vol. 14, edited by A. G. Norman et al. Academic Press, 111 Fifth Av., New York 3, N. Y. 1962. Pp. 432. Illus. $13.00. Nineteen authorities have contributed papers to this volume devoted to reviews and research progress in soil and crop science and developments in agronomic practice. This rich harvest is arranged under eight chapters: (1) laterite; (2) rice improvement and culture in the U. S.; (3) rainfall erosion; (4) soybean genetics and breeding; (5) fertilizers and the efficient use of water; (6) evaluation of fertilizers by biological methods; (7) isotopes methods and uses in soil physics research; and (8) management of soybeans. Highly recommended.

A SYNTHESIS OF EVOLUTIONARY THEORY, by H. H. Ross. Prentice-Hall, Englewood Cliffs, N. J. 1962. Pp. 387. Illus. $10.00. This outstanding new book by an eminent authority was written, for those having a background in the natural sciences, to integrate knowledge from various fields into a unified theory of evolution, "from cosmic dust to biomes." The sections of the book are concerned with the expansion of evolutionary concepts, the evolution of the universe, origin and nature of life, sources of variability, natural selection, species and species change, increase in number of species, evolution of communities, origin of biome and succession, comparative evolution of biomes, the geotectonic factor, the organization of matter and life. This stimulating book is highly recommended.

NON-PROFIT CORPORATIONS AND ASSOCIATIONS, by H. L. Oleck. Prentice-Hall, Englewood Cliffs, N. J. 1956. Pp. 460. $12.50. With the increase of non-profit organizations in the United States, there has arisen a need for this excellent book which explains how they are organized, how they are managed, and how they are dissolved. The treatise provides lawyers and laymen alike with an exposition of the American system of procedures, rights, and liabilities of such organizations. This comprehensive book fills a long felt need and will be welcomed by all who are involved in the management of non-profit organizations. Highly recommended.

FOSSILS: AN INTRODUCTION TO PREHISTORIC LIFE, by W. H. Matthews III. Barnes & Noble, 105 Fifth Av., New York 3, N. Y. 1962. Pp. 337. Illus. Paperback. $5.75. This introductory book is designed primarily as an amateur collector's handbook. However, it should prove helpful to students of paleontology and historical geology. It provides a general background in earth history, and a survey of the types of plants and animals that inhabited the earth in prehistoric times. Dr. Matthews is to be congratulated on his attractive book which is highly recommended.

PREHISTORIC LIFE ON EARTH, by Kai Petersen et al. E. P. Dutton & Co., 300 Park Av. So., New York 10, N. Y. 1961. Pp. 163. Illus. $4.95. This is an adapted and supplemented version of Petersen's brief summary of evolution of life on earth with emphasis mostly on animal life. The evolutionary processes are illustrated by means of descriptions of actual reconstructions of the types of creatures and environments that have succeeded one another through the millions of years of earth's prehistory. The text illustrations are outstanding. This charming book is recommended to all readers, and is a bargain at the price indicated.

[**PLANT LIFE LIBRARY**, continued on page 26.]

# THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

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[Affiliated with the American Plant Life Society]

[AMERICAN AMARYLLIS SOCIETY, continued from page 2.]

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Mrs. Emma D. Menninger, Asst. Registrar, 700 North Old Ranch Road, Arcadia, Calif.

Correspondence about the registration of plant names should be sent directly to Mr. Morton, and a self-addressed, stamped envelope should be enclosed if a reply is expected.

### (d) AMARYLLID SECTIONS

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The Chairman and Secretary of the Council also function as Official Instructors.

*Examinations.*—Those desiring to take the examination for the Official Amaryllis Judges Certificate, should preferably apply to the Official Instructor for details. See Plant Life Vol. 17, 1961, pages 30—34, for further details.

All accredited Amaryllis judges of the American Amaryllis Society are members of the Council.

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*Carthage, Indiana*

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Mrs. Fred Tebban, *Florida*
Mrs. Fred Flick, *Indiana*
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Mrs. K. B. Anderson, *California*
Dr. Joseph C. Smith, *California*

Each leader directs one Robin, except Mrs. Flick, the Chairman, and Mrs. Tebban, who each directs two Robins.

(Send a self-addressed stamped envelope, if a reply is expected.)

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[**CLOUETTE—AMARYLLIS RECORDS**, continued from page 132.]

hybrid *Amaryllis*. Five seeds of *Amaryllis blumenavia* from Dr. Traub planted over a month ago shows only one has sprouted up to the present, but others may sprout later. Four seeds of *Crinum gouwsii* from Dr. Traub have all sent out roots, and apparently will send up sprouts later. Many other amaryllid seeds from Dr. Traub have sprouted. Seeds from my own *Amaryllis* crosses have been planted and germination has been good in some cases and less so in others. All of these hybrids are making good growth.

[**CORRIGENDA**, continued from page vi]

# REVISION OF "THE PHYLA OF ORGANISMS"

Hamilton P. Traub

The summary entitled, "The Phyla of Organisms" (Traub, 1962) was prepared in 1961 and published in 1962. In the same year, Stanier and van Niel (1962) published a valuable contribution synthesizing the knowledge about the blue-green algae and the bacteria. The outstanding new concept advanced is that the blue-green algae and the bacteria have a similar cellular structure, the *procaryotic*, as contrasted with the *eucaryotic* cellular structure of the rest of the cellular organisms (plants, heteroplants (fungi) and animals). On the basis of this contribution, the phyla are slightly rearranged with appropriate group name changes as shown in Table 1.

**TABLE 1.**

- Kingdom 1. PROCARYOTAE
  - Subkingdom 1. AUTOPROCARYOTAE
    - Superphylum 1. AUTOCHEMOBACIAE
      - PHYLUM 1. **AUTONITROBACAE**
      - PHYLUM 2. **AUTOHALOBACAE**
      - PHYLUM 3. **HYDROGENOBACAE**
      - PHYLUM 4. **CARBOXYBACAE**
    - Superphylum 2. AUTOPHOTOBACIAE
      - PHYLUM 5. **CHROMATOBACAE**
      - PHYLUM 6. **CHLOROBACAE**
      - PHYLUM 7. **CYANOBACAE** (ex blue-green algae)
  - Subkingdom 2. HETEROPROCARYOTAE
    - PHYLUM 8. **HETEROBACAE** (heterotrophic bacteria)
- Kingdom 2. EUCARYOTAE
  - Subkingdom 1. AUTEUCARYOTAE (autophototrophic plants)
    - Superphylum 1. ANEMBRYOPHYTIAE
      - PHYLUM 9. **RHODOPHYTA**
      - PHYLUM 10. **PYRROPHYTA**
      - PHYLUM 11. **CHRYSOPHYTA**
      - PHYLUM 12. **PHAEOPHYTA**
      - PHYLUM 13. **EUGLENOPHYTA**
      - PHYLUM 14. **CHLOROPHYTA**
    - Superphylum 2. EMBRYOPHYTIAE
      - PHYLUM 15. **BRYOPHYTA**
      - PHYLUM 16. **TRACHEOPHYTA**
  - Subkingdom 2. HETEROPLANTAE
    - PHYLUM 17. **RETICULOMYCOTA (Labyrinthula)**
    - PHYLUM 18. **MYXOMYCOTA**
    - PHYLUM 19. **EUMYCOTA**
  - Subkingdom 3. ANIMALIA
    - (Phyla nos. 20 through 43, incl., remain the same as in Traub, 1962)

"The Phyla of Organisms" (1962) will be revised in Traub,—"Lineagics", to be published in 1964.

## LITERATURE CITED

Stanier, R. Y., and C. B. van Niel. The concept of a bacterium. Arkiv. Microbiol. *42*: 17—35. 1962.

Traub, Hamilton P. The phyla of organisms. Publ. as a suppl. to Plant Life, vol. 18. 1962.

# PLANT LIFE

## VOLUME 20

[Nos. 1-4, Jan., Apr., Jul. & Oct.]

## 1964

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

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## CORRIGENDA

### PLANT LIFE, VOL. 19. 1963

Page 17, under "LITERATURE CITED", 2nd line from bottom, for "Vol. 18. 1963" read "Vol. 18. 1962".

Page 55, under "Tribus Traubieae, etc.", 1st line, delete "genus Brunsvigia Heist."

### THE GENERA OF AMARYLLIDACEAE, BY HAMILTON P. TRAUB; PUBL. 1963

Page 17, under "44. HABRANTHUS", "H. brachyandrus", change "48" to "24".

Page 36, under "10. TRISTAGMA", "Syn.—", delete reference to "Gardinia Bert.", which is a *nomen nudum* (see Plant Life, Vol. 20. 1964).

Page 54, 15th line from bottom, "for "Buty" read "Bury".

(CONTINUED from page 130.)

EXPLORING THE UNIVERSE, edited by Louise B. Young. McGraw-Hill, 330 W. 42nd St., New York 36, N. Y. 1963. Pp. 457. Illus. $6.95. This stimulating book is based on contributions of fifty-three outstanding ancient and modern scientists. The subject matter included is calculated to up-date the adult members of society on the rapid progress in science in recent times. The selections are arranged under convenient headings—what is the nature of science?; is there a scientific method?; is there an order in nature?; is truth scientific?; what is a scientific fact?; is there a limit to man's understanding of nature?; are theories true?; how was the universe created?; is there other life in the universe?; why explore space?; and what are the values and limitations of science? This thought-provoking book is highly recommended to all adults who wish to keep up with recent progress in science.

THE NEW YORK TIMES GARDEN BOOK, edited by Joan Lee Faust. Alfred A. Knopf, 501 Madison Av., New York 22, N. Y. 1962. Pp. 368 + i—xi. Illus. $6.95. Outstanding authorities contribute articles on various phases of gardening to the Sunday edition of the New York Times. The garden editor has selected more than 100 of these for inclusion in this attractive book. The subject matter covers a wide range. Part 1 is devoted to landscaping; Part 2, to trees and shrubs; Part 3, to garden flowers; Part 4, to lawns; Part 5, to places to garden; Part 6, fruits and vegetables; Part 7, to propagation; Part 8, to house plants, and Part 9, to the four seasons in the garden.

PLANT PATENTS; WITH COMMON NAMES, 1 THROUGH 2207, 1931-1962. Published by the Amer. Assoc. of Nurserymen, 835 Southern Bldg., Washington 5, D. C. 1963. Pp. 74. $2.00. This is a revised edition of "Plant Patents; Common Introductory Names" which has been reviewed in previous issues of Plant Life. The new directory, page size 8½ x 11", contains all of the information of the previous directory and the five annual supplements, and the information on the plant patents granted to the end of 1962. The new directory, as the old, provides separate numerical and alphabetical listings. The numerical listings show besides the plant patent number, the date of issue, the kind of patent, the common name assigned the plant, the name of the originator, and the name of the person or company to whom the patent has been assigned, providing the patent had been assigned prior to issuance of the patent. The common names are alphabetized by species. The combined list of originators and persons to whom the patents have been assigned, is also arranged alphabetically with mailing addresses.

AN ANNOTATED CHECKLIST OF CULTIVATED PALMS, by H. E. Moore. The American Palm Society, 7229 S. W. 54th Av., Miami, Fla. 33143, Pp. 65. $2.00, including postage. This 65 page publication is the culmination of several years' work by Dr. Moore. It represents an up-to-date compilation of the correct botanical names of the palms now known in cultivation, also names frequently used in the trade, country of origin, authorities, and references in botanical literature. It will become an essential part of the library of anyone who is interested in the correct identification of palms.—*David Barry, Jr.*

THE DEVELOPMENTAL ANATOMY OF ISOETS, by D. J. Paolillo, Jr. Univ. of Illinois Press, Urbana, Ill. 1963. Pp. 130. Illus. Paperbound. $2.50; clothbound, $3.50. This is another volume in the important series of Illinois Biological Monographs. In this research project, the developmental anatomy of the *Isoetes* was established on the basis of comparisons in the structure from the sporling to the adult stages. This includes observations on growth of the shoot tip, lateral meristems and root-producing meristems, and on procambial differentiation, root initiation, and the growth of the apical meristem of the root. The 19 plates at the end of the book are excellent. This outstanding book is highly recommended to the plant scientist.

(CONTINUED on page 5.)

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PLANT LIFE, VOL. 20, NO. 1, January, 1964

# AMARYLLIS
# YEAR BOOK
# 1964

Year Book of
The American Amaryllis Society
31st issue

GENERAL AMARYLLID EDITION

EDITED BY
HAMILTON P. TRAUB
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THE AMERICAN PLANT LIFE SOCIETY
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Mr. W. D. Morton, Jr., **La.**
Mr. S. Y. Caldwell, **Tenn.**

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*Deceased.

### (b) CORRESPONDING FELLOWS

Antilles—Dr. H. F. Winters, **Mayaguez, Puerto Rico**
Brasil—Dr. Alberto Castellanos, **Rio de Janeiro**
Australia—Mr. Wm. Morris, **Warners Bay, New South Wales**
Finland—Mr. I. V. O. Pirhonen, **Helsinki**
England—Mr. Reg. F. Harradine, **Potters Bar**
India—Mr. Sydney Percy-Lancaster, **Lucknow**
South Africa—Mr. Leon Boshoff-Mostert, **Balfour**
Argentina—Prof. Pedro F. Ravenna, **Buenos Aires**

[THE AMERICAN AMARYLLIS SOCIETY—continued on page 131.]

# PREFACE

The outstanding cover design featuring *Amaryllis calyptrata* is the work of the Artist to the Society, Prof. Penrith B. Goff of the University of Chicago. Again, he is to be congratulated on an excellent job.

It is fitting that the 1964 issue of THE AMARYLLIS YEAR BOOK is dedicated to Mr. Samuel Y. Caldwell, who is known to his many friends as Sam Caldwell, for his outstanding contributions toward the advancement of various amaryllids, particularly *Lycoris* species and hybrids. Your editor had been interested for a long time in the genus *Lycoris* and it had been difficult to make progress toward interesting the general gardening public in this utterly beautiful subject until Mr. Caldwell took up the cause. He made a collection of as many species as he could obtain and flowered them at his home in Tennessee which is an ideal location for many of the species, excepting the very tender subtropical ones. He furnished herbarium specimens to the writer so that they could be worked into the *Lycoris* identification project. During the past two decades most of the species have been identified. Only a few still have to be traced down. Mr. Caldwell's contribution toward determining the garden value of *Lycoris* in the United States is outstanding. He not only assisted in the identification of species, but he also began the breeding of Hybrid *Lycoris* is earnest and the outstanding results he has obtained are reported in a paper in the present issue. For his eminent service toward the advancement of *Lycoris,* and other amaryllids, the 1964 WILLIAM HERBERT MEDAL has been awarded to him. The best wishes and congratulations of the entire membership go with this award. Mr. Caldwell contributes a charming autobiography to this issue.

Mr. Percy-Lancaster again favors the members with his charming reports on his trip from India to Rhodesia and return, and on his holiday in Southern Rhodesia. Mrs. Clint reports on an interesting trip to the Mexican West coast.

The articles on *Amaryllis* in the present issue include a report on the flowering of *Amaryllis calyptrata* by Mr. Buck, and on the growing of this species by Mr. Clouette. Mr. Crochet and Mrs. Barry write on *Amaryllis* breeding, and on the growing of these plants in pots. Mr. Buck reports on the outstanding Angell Amaryllis hybrids; Mr. Morris presents an article on species *Amaryllis* as grown in Australia; Mr. Clouette, Mr. Beckwith Smith and Mrs. Pickard, write about *Amaryllis* culture. Mrs. Herold indicates the landscape value of Amaryllis; Mr. Perrin reports on overwintering *Amaryllis,* and Mrs. Tebben writes about the effects of the freeze in Florida on *Amaryllis.* Mr. Sudd writes on the culture of *Amaryllis* under artificial light. Mr. Goedert again favors the members with an excellent review of the *Amaryllis* season just past. The Supplement to the present volume consists of the "Catalog of Hybrid Amaryllis Clones."

The other amaryllids are not neglected. In addition to the fine *Lycoris* report by Mr. Caldwell, there are articles by Mr. Hunt on a new pink *Lycoris* and the creamy white species; and on hybrid *Lycoris* by Dr. Takemura. Mr. Higginson and Mr. Hannibal, and Mr. Hannibal write about Crinums. Mrs. Shirley again contributes a fine article on American Crinums. Mr. Korsakoff writes about the preparation of herbarium specimens, and about his interest in the Zephyrantheae. Dr. Flory reports on chromosomes in *Hemerocallis.* Mrs. Clint writes about a fine hybrid involving *Zephyranthes bifolia.* Mr. Decker reports on growing amaryllids on tap water; and Mr. Hunt on winter hardiness in amaryllids.

There are other articles, including also reports on the *Amaryllis* exhibitions in 1963; a report on the honors received by Mrs. Pickard, and other contributions.

Contributors to the 1965 issue of THE AMARYLLIS YEAR BOOK are requested to send in their articles by August 1, 1964, in order to insure earlier publication of this edition. Unless articles are received on time, publication will again be delayed to June or July or even later as with some issues in the past. Your cooperation toward earlier publication will be greatly appreciated.

*December 15, 1962,*
*5804 Camino de la Costa,*
*La Jolla, California 92-037*

*Hamilton P. Traub*
*Harold N. Moldenke*

## TRAUB'S "AMARYLLIS MANUAL", SECOND PRINTING

Word has been received from MacMillan Co., 60 5th Av., New York, N. Y. 10011, that the second printing of this work will be ready on July 14, 1964.

### TRADE CATALOG RECEIVED

Bloem Erf Nurseries, P. O. Box 210, Stellenbosch, South Africa. "Catalogue of South African Native Bulbs, Seeds and Plants" 36th Edition. Jan. 1964—1965. Mrs. L. Richfield, proprietor. Among amaryllids, the following genera are represented—*Brunsvigia rosea* (syn.- "Amaryllis belladonna Herb. 1821, non L. 1753"), *Boophone, Clivia, Crinum, Haemanthus, Nerine, Tulbaghia.* Although there is blank space, it is stated that *Cyrtanthus* are not listed because "It is simply not possible to describe these year after year, when so many other items are offered." Thus the enthusiast interestd in South African amaryllids misses *Cyrtanthus* (including *Vallota*), *Agapanthus, Ammocharis, Cybistetes,* other *Brunsvigia* species, *Anoiganthus, Cryptostephanus, Gethyllis, Apodolirion, Hessea, Carpolyza, Strumaria* and *Pancratium trianthum.* It is hoped that these deficiencies may be made good in a future catalog.

JACK'S NURSERIES, Jack & Jean Bester, P/bag, Meyerton, Transvaal (J. J.), South Africa. This price list is concerned with various plant species, but seeds of the large-flowering **Amaryllis** hybrids represent the only amaryllids offered. The Besters report on collection trips, and possibly they will list other amaryllids in later price lists.

This Edition

Dedicated to

Samuel Yongue Caldwell

(CONTINUED from page vi.)

PRINCIPLES OF NUMERICAL TAXONOMY, by R. R. Sokal and P. H. A. Sneath, W. H. Freeman & Co., 660 Market St., San Francisco 4, Calif. 1963. Pp. 359. Illus. $8.50. There has been a need for a text on the application of mathematical procedures to the grouping of organisms into lineages, and the authors are to be congratulated for producing the first book on the subject. The necessary formulas are given along with the text discussions, and in the appendix, brief illustrative examples are presented for the assistance of those who have not been exposed to mathematical compution by means of electronic computers. The authors are apparently under the impression that they must demolish the customary Neo-Adansonian procedures that are presently used by the great majority of lineagicists which have served well. These consist in (a) making groupings on the basis of overall similarities with or without the use of electronic computers; and (b) then making adjustments, if necessary, on the basis of bioevolutionary theory and its application. They claim that the procedures generally followed are incorrect, and they believe that it is necessary to set up a straw-man to be demolished. However, in the last analysis they agree that their method is quite similar to the customary Neo-Adansonian method as already indicated, but they emphaisze the use of electronic computers in making the partial correlations. The fundamental flaw in their argument is in confusing the two phases of lineagics—the basic phase (what is true in nature?) and the applied phase (what is useful?). Aside from this unnecessary effort to demolish their straw-man, the book fills a definite need, and is a necessary addition to the library of every lineagicist.—*Hamilton P. Traub*

MANUAL OF VASCULAR PLANTS OF NORTHEASTERN UNITED STATES AND ADJACENT CANADA, by H. A. Gleason and A. Cronquist. D. Van Nostrand Co., 120 Alexander St., Princeton, N. J. 1963. Pp. 810. Illus. $11.75. This is a companion volume for "The New Britton and Brown Illustrated Flora". However, in the presentation, the junior author has taken into account recent studies concerning the plants included. The book covers the vascular plants, including ferns, grasses, trees, weeds, and wild flowers in northeastern United States and adjacent Canada. This book is highly recommended to the layman, professional plant scientists, and students, including foresters, conservationists, county agents, scout masters, and the serious amateur plant scientists.

(CONTINUED on page 52.)

Herbert Medalist—Samuel Yongue Caldwell beside a group of *Lycoris squamigera* Maxim., in his garden, Nashville, Tennessee.

# SAMUEL YONGUE CALDWELL

## An Autobiography

What prompts a person, brought up and educated for the legal profession and following it for a time, to wander off and make a career in the completely unrelated field of horticulture, where he has no formal training at all? That query comes up sometimes at the conclusion of programs I do, which the garden club people generously refer to as ''lectures.''

It is not entirely facetiousness when I explain that lawyers often have to work for people who are mad at each other. They get involved in disagreements, arguments, bickering, strife and contentiousness. Horticulturists, on the other hand, work not only with plants, which are fascinating and beautiful, but also with the very nicest kind of people—gardeners—who are kinder, friendlier, more generous and more pleasant to be around than the average run of human beings.

That, of course, over-simplifies my reasons for changing vocations. I gravitated into my present work because I happen to like plants and people.

I was born November 8, 1904 on a farm belonging to my grandparents in the pleasant rural community of Brentwood, just 12 miles south of Nashville, Tennessee. My father was a doctor, and with an older brother and two younger sisters I grew up in the Nashville area. Underweight and sickly as a child, I was out of school a good deal and spent the time in the country on the farm. Fishing, hunting and keeping an odd assortment of pets—the best was a young raccoon—were chief interests. I also became intensely interested in photography—so much that when in the winter of 1918 I made ''big money'' selling hides of muskrats and minks trapped along a little creek in the farm meadow, I spent nearly all of it on a big, professional looking camera that made postcard size pictures on glass plate negatives.

In and out of school, as health permitted, I eventually received a Law degree from Vanderbilt University in 1932 and was admitted to the State Bar. Meanwhile, some indications of a stronger-than-average liking for plants and gardens were showing up. I ordered seeds each year from the famous old Peter Henderson and Henry A. Dreer catalogs and cultivated both flowers and vegetables with enough success to have our place included a couple of times on local spring garden ''pilgrimages.'' New and ''different'' plants attracted me particularly. Aquatic plants became a major interest, and during the summer of 1928 I worked at the William Tricker waterlily nursery near Cleveland, Ohio. It was a happy time, as other nurseries of various kinds were nearby and I was constantly associated with professional plantsmen.

At summer's end I made a round-about home trip in my Model T Ford, spending several days in St. Louis, where I was thrilled to meet

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in person a noted waterlily hybridizer, Superintendent George Pring, at the Missouri Botanical Garden. He was the first of many ''names'' I have come to know over the years in the field of horticulture, and to this day I count him a friend.

But there were many different plant interests, and amaryllids were among the early ones. During my sophomore year at Vanderbilt a lady who lived across the street from my fraternity house gave me a bulb and the most fascinating flower I had ever seen—something called ''red spiderlily.'' I was already growing ''Amaryllis hallii.'' Numerous descendants of these original bulbs remain with me today, but the names have been changed, for we now know them as *Lycoris radiata* and *L. squamigera.*

During the 'thirties' I practiced Law briefly, then did legal research work for our State Department of Education. Also I continued gardening and began free-lance writing for farm, garden, photographic and home workshop publications. By this time my photographs were up to professional standards and they sold many of my articles. Still underweight and never in robust health, I managed to store up extra vitality by two months of outdoor life each summer, serving as a staff member at a boys' camp in the East Tennessee mountains.

World War II brought changes. I went into the Infantry in 1942 and got basic training at Camp Wolters, Texas. There I ''discovered'' dozens of native wildflowers, and during ten-minute ''breaks'' used to gather seeds and store them in my cartridge belt to send home later. Incidentally, the showy ''Texas Plume,'' *Gilia rubra,* did very well back in Tennessee, and in later years I was to see it thriving in Nebraska gardens.

My early liking for guns paid off in the army; I became one of Fort Benning, Georgia's ''90-day-wonder'' boys, was commissioned and continued until 1946, mainly as an instructor in weapons, at Infantry replacement training centers. More than two years were spent at Camp Blanding in northern Florida, and offtime hours brought opportunities to cultivate many garden-minded friends. Right at Blanding I found Major Henry R. Totten, ''Mr. Botany'' to Carolinians because of his long service to the University of North Carolina as head of the Botany Department. With him and Mrs. Totten I trekked the woods of Penny Farms and journeyed to Jacksonville for meetings with groups of wonderful garden club people who even during the war years gave beautiful camellia and orchid shows and planned the splendid Garden Center that was to come.

Having been a member of the American Amaryllis Society and other plant societies for several years, I knew that I was near centers of horticultural interest. I got acquainted with Dr. H. H. Hume and Prof. John V. Watkins in Gainesville, spent pleasant Sunday afternoons with John R. Heist and his bulb plantings in St. Augustine, and had stimulating visits with Wyndham Hayward and the late Ralph W. Wheeler in Winter Park. In Orlando I was awed and entranced by the hospitality of Mulford and Racine Foster; their Orchidario on Magnolia avenue became a week-end Mecca, and I spent Christmas leave time with them in 1943, '44 and '45. Years later I was to visit at their marvelously interesting new home, Bromel-La, outside Orlando.

Thus in spite of the relative grimness of war years I began to acquire a sort of informal horticultural education "by association."

Terminal leave as an army captain in 1946 allowed me a two-month California tour which included such highlights as a visit with the late Fred Howard in Montebello—I'm still growing choice clivias selected from some 2,000 hybrids he had in bloom; a never-to-be-forgotten stop with Mr. and Mrs. Cecil Houdyshel in La Verne; seeking peak bloom on irises with the late Carl Milliken in Arcadia, and meeting J. N. Giridlian at his memorable Oakhurst Gardens, also in Arcadia.

Returning to civilian work, I knew it had to be something connected with plants, so I became associated with the American Iris Society as editor and executive secretary, at the central office, then located in Nashville. And my grandparents' farm became my own home; here there was room to grow all the shade and ornamental trees, the evergreens and flowering shrubs, the perennials and bulbs I desired. I still live there, by the way, along with my mother and an aunt; I have never married.

A neighbor and gardener friend was the late Thomas A. Williams, then doing a weekly question-and-answer session for amateur gardeners as the Old Dirt Dobber on CBS Radio's Garden Gate program. I had occasionally contributed items for Mr. Williams to use on the air, but had no idea that he had suggested me to CBS executives as a possible successor. However, in 1949 he passed away suddenly after a heart attack, and within a week I was the new Old Dirt Dobber with a coast-to-coast radio audience through more than 200 stations.

That started a hectic but wonderful ten-year period. I studied, traveled, visited gardens, asked questions and listened to plantsmen. Then on Saturday mornings I passed along to radio listeners some of the things I'd learned.

By the late 'fifties, however, television had taken over as the top medium in the broadcasting field, and big-time network radio was passing out. I went out with it.

Actually, at the present time I am doing more radio work than ever, but simply have smaller audiences. I do one program for listeners in my local area and another that is transcribed and heard in a number of states. Then I've done numerous television shows about plants and gardens, have written and illustrated a couple of small books, and as time permits I contribute occasional articles and photographs to garden magazines. Another job is acting as horticultural advisor for a chain of garden centers.

Happily, my work allows me time for a great deal of gardening "in person." I enjoy planting and growing a very wide variety of plant materials, and every season brings something new. Although not naturally a joiner, I do belong to most of the plant societies—everything from the African Violet Society of America to the Northern Nut Growers

Association. Their publications held keep me up-to-date on what's happening in the world of gardening. I've been especially close to the American Iris and American Hemerocallis societies and have appeared many times on their national convention programs; also I've been convention speaker for the peony, daffodil, rose, African violet and gesneriad societies. Attending meetings of these organizations has meant wonderful friendships with gardeners and plantsmen all over the country.

All plants interest me, but I'll admit a special feeling for the moderately rare or at least uncommon things. That probably accounts for my long-time devotion to lycorises. Their strange growth and flowering habits and unpredictability, along with great beauty in some species, make them most intriguing. Naturally it is exciting to see my new hybrids come into bloom each year.

But more remarkable than any planned progress with lycorises was my involvement in a purely accidental occurrence. Let's face it; in all the world there just aren't many dyed-in-the-wool lycoris ''nuts'' —people who through a lifetime go out of the way to acquire every species available. I happen to be one of them. May our small tribe increase, but meanwhile it is admitted that we are few and far between. Well, away back in 1925 the mother of a Methodist missionary stationed in Huchow, China, returned to the States, bringing along a few ''spiderlily'' bulbs collected from the wild in hills outside Huchow. Had the law of averages been working, these would have been any one of several nice but not uncommon bulb flowers that China has contributed to gardens. As events later proved, they were actually a type of hardy golden lycoris quite unknown in cultivation.

Again, the law of averages would have brought the good lady home to Peoria or South Bend or Binghamton, or any one of innumerable communities where no ardent lycoris fancier lived. With no one around to recognize their possibilities, the pretty spiderlilies might have remained indefinitely in obscurity.

But things didn't work out that way. By incredible coincidence this lady was from Nashville, Tennessee, my own home town, where she returned and planted the bulbs. It is true that for 33 long years we lived here—the bulbs and I—as strangers, just a few miles apart. Then in 1957 a local gardener who had seen them learned of my interest in flowers of that type and told me about them. When finally I saw a clump flowering, August 15, 1958 (see photo, page 78, PLANT LIFE 18: 1962), it was like finding fabled gold at rainbow's end. I knew from their remarkable size and beauty and their record of having lived outdoors here in a climate where sub-zero winter temperatures are common, that they were vastly different from *Lycoris aurea* grown in our Deep South—different, in fact, from any lycoris species thus far recorded. It was a thrill to photograph them and report the find to Dr. Hamilton P. Traub (see ''A Hardy Golden Lycoris,'' page 97, PLANT LIFE 14: 1958).

This is a big and showy lycoris and may eventually be a widely grown garden subject. However it may be finally identified or named—

and we currently call it "L. sperryi" for convenience—I am happy to have had even a chance part in "discovering" a golden garden treasure.

## FROM INDIA TO AFRICA AND BACK

Sidney Percy-Lancaster, *National Botanic Garden, Lucknow, India*

In February 1963 I took passage by the S. S. Karanjia, a B. I. S. N. boat, for a four month holiday in Southern Rhodesia with a view to collect my library, clothes and bring back my Gloriosa tubers, as I had decided to spend the last few years of my life in India. Bad luck seemed to have dogged my steps this trip.

The first Port we visited was Karacki, in Pakistan, I had not contacted friends in this City and therefore had to be satisfied with a quick round of gardens along the main thorofare. We sailed across to Mombasa, on the African coast where I expected to meet a friend and be taken to a Nursery 12 miles from the City. There was no sign of him and to aggravate matters, we stayed in Port two extra days—and I waited for some message. Later I heard that he had visited Nairobi and there fallen ill, returning to Mombasa only after the boat had sailed. I had picked up "flu" from a fellow passenger and was quite ill but game to go ashore. As there was no cargo or passengers for Dar-es-salaam, we went to Zanzibar and I stayed aboard. Then back across the Ocean we went to the Seychelles, here I had promised myself a walk to the Botanic Garden to photograph the Double Coconut Palms and get seeds and Gloriosa tubers. Passengers were not allowed to go ashore till after 4-30 p. m. and as it was a miserable dull day, with light showers, I stayed in my cabin. Our last Port was Beira but, though we reached on time, there was some delay that prevented the discharge of cargo and I spent another night on board. I had telegraphed my daughter-in-law telling her of my delay but rather than risk over-tiring myself in wandering about the City I spent the day at the station, which has no passenger facilities. In due time I landed in Salisbury and spent the next few months enjoying myself.

On the return trip to India, I left for Beira, on the 15th August to catch the S. S. Kampala which sailed on the 17th. We called at Mocambique but I did not go ashore, at Dar-es-salaam I walked two miles to the Public Garden, there I picked up two *Sansevieria* leaves, also seeds of a *Crinum* and of a couple of trees. Next day we were at Zanzibar and I went ashore as soon as I could, met the Director of Agriculture, was passed on to the Superintendent of Parks and Gardens, and I discovered another five new varieties of *Sansevieria* and a few other interesting plants. It was a successful visit! Mombasa was again a disappointment, the friend could not be traced while the Superintendent of Parks and Gardens was on sick leave. I was given a plan of where he lived but though I spent the next five hours discovering new parts of Mombasa I failed to find his home.

Our last Port was Mahé, in the Seychelles, and I kept my fingers crossed, would I be lucky and get what I wanted? I met the Director of Agriculture, went round the garden, saw their wonderful collection of Palms, was able to supply names of several plants and and collected two *Crinum* bulbs and a couple of tubers of *Gloriosa superba* that might differ slightly from our Indian species. With several new *Sansevieria,* I had obtained in Salisbury, and two *Crinum* species and a *Boöphone* (Buphane) gathered from the "bundu," the wilds of the capital, as well as an assorted collection of South African bulbs, several dozen *Hemerocallis,* and a number of *Stapelia* species from Wankie, I carried two large parcels with Phytosanitary Certificates, and hoped to get through the Customs without much trouble. Fumigation was demanded and I had to submit the contents for the "death" chamber, resulting in the loss of the names of the *Hemerocallis.* I hope that what survives will give some value to my holiday!

## HOLIDAY IN SOUTHERN RHODESIA

Sidney Percy-Lancaster, *National Botanic Garden, Lucknow, India*

I had an opportunity of visiting some of the "high lights" of Southern Rhodesia before I left Africa and send you a short note of the trip in case it may be of interest to your readers. To see, for instance, the Victoria Falls in an illustration is not quite the same thing as viewing it "in the flesh" and you fail to get the thrill when you come face to face with this stupendous spectacle. However I would ask you to wait a bit and hear something about Salisbury, the Capital of the Federation, where I have lived for three years. It is quite a young city, 75 years old, situated at an elevation of 5000 feet, and with seasons the reverse of those in the northern hemisphere. Traffic is entirely motorised, the roads excellent, precautions against overspeeding in the city are numerous, and attempts to "keep the city clean" are very successful. Salisbury has the largest Sales centre, in Tobacco, in the world, and in the busy season 700 to 800 bales of tobacco leaf are auctioned *every hour!*

This trip was undertaken really at the wrong time, from an horticultural point of view for it is winter at this time of the year,—July-August—and everything was drab and dry, only a little colour from the aloes and not many autumn tinted bushes, or trees. We passed through Bulawayo to pick up food for our stop at the Matopos, for though one can hire the huts at the camp, there are no arrangements for meals. We spent two days at the Marleme Rest Camp, saw the small Game reserve, the Dam, and drove along the main drives. Two caves were visited with rock paintings, both very exposed to the weather, and dating back to 40,000 B. C. for the first occupants and to 1 A. D. for the last. The floor of the huts was wood ash, 14 feet deep. The chief attraction was the tomb of Cecil Rhodes, and near by lie two other pioneers. A Memorial is raised a little distance away to 33 soldiers who were killed in an attempt to arrest the Matabele King who had stirred up rebellion. The Matopos are a low range of hills, composed of large blocks of rocks, some precariously balanced; in some places the hills are densely covered with vegetation, in others a ''rock'' scape meets the eye with huge euphorbias. All rivers I noticed on the trip were named; some were dry, others carried a trickle of water and very few could be called streams. The roads are excellent; every few miles there are ''Lay by's'' where, in a deep bay of the road, motorists can stop. There are no shade trees, or shelter, but every bay has a blue painted drum with LITTER in large letters! The injunction to ''Keep the City clean'' seems to have been extended to the country-side! Our next stop was Wankie, the National Game Reserve and as we could not get accomodation in the Rest Camp we had to stop at an Hotel in Dett, 15 miles away. I was very unfortunate with my camera, three films, used for scenes at the Matopos and at Wankie failed—24 snaps—because I had been supplied with the wrong class of film. At Wankie the animals were decidedly inquisitive; they did not bolt when the car drove by (25 miles per hour is the speed limit) ; they stood, and stared, and then quietly melted into the light forest background. The deer walked a few paces into the tall grass and disappeared. Elephants were everywhere—we were held up by a pair on one occasion while they indulged in a dust bath, they saw the car but blocked the highway; when we drove on after they had given us a clear passage, we met a herd of some 50 elephants that had crossed the road and left these two loiterers behind! Then another experience was when we were compelled to stop as there, on the drive, lay five young lionesses, in cat like attitudes, after a heavy meal off a Gnu (wildbeest). They were perhaps 20 feet from the car, but not nine feet away two other lionesses tore the last hunk of meat off the bones of the Gnu. They were too busily engaged to worry about the spectators! Buffaloes looked terrifying, they were always in large herds of 50 or more. At the observation Post animals came morning and evening for a drink and we saw zebra and giraffe in company, buffalo in herds but what was most interesting was a herd of elephants from the tiny toddlers to old stagers. After the drink there was a little horse play—rather elephant play!!—pushing and squirting of water over each other. The number of animals that you see on a trip depends on the season, and your luck, we saw the following numbers, an approximate guess, for many more may have been in the background of the herd: Elephants, 200—Gnus (wildbeest), 500—Buffalo, 400—Deer of at least a half a dozen species, 200—Zebra, 100—Giraffe, 80—Apes and Baboons, 100—Warthogs, 60—Lions, 19—Lionesses, 8—Ostrichs, 40—Hyenas, 3—Rhinoceros, 1—and birds in great variety. The area of this Game reserve is about 30,000 acres, there are 14 dams and water pans in different places. It is estimated that there are 4500 elephants alone in the Game Reserve and other animals must be in like proportion.

From Wankie we drove to the Victoria Falls, arriving late in the evening and restraining our impatience to see the actual Falls, we walked from the Rest Camp to the banks of the placid Zambesi, saw the immense plumes of spray and retired. Next morning, after a meal, we drove to the Falls and walked down to the Eastern Cataract. When faced with the real Falls you stand with your emotions, more or less paralysed. Your admiration of the beauty gives place to the awe of the spectacle and this is followed by fear while you take especial care that you do not take that fatal step and end up 300 feet below in the 200 feet wide chasm! So many have tried to snap some particular sight, and—failed!! The river only loses control of itself about 100 yards from the lip, then in a fury, with wild tossed mane, the river leaps into the chasm, sending up a spray cloud 1000 feet high or more. To get a photograph of the entire Falls is all but impossible, even at this season, with the river at its lowest one would have to wait till the spray was blown aside. The Victoria Falls are one and a half times as wide and twice as high as Niagara, the figures for the quantity of water that goes over the lip every minute and what it weighs did not interest me as much as the actual sight. There is a strip of land on the opposite side of the Falls, called the Rain Forest, most of the area is bare of even bushes though there are trees in the background, but the spray from the Falls which varies from a ''Scotch mist'' to a light shower, keeps this spot wet all the time. I noted patches of *Gladiolus primulinus*—and the capsules contained germinated seeds, some seedlings 2 to 3 inches long, *Haemanthus multiflorus* was in leaf, there were many tangled masses of *Solanum seaforthianum, Lantana camara, Plumbago zeylanica,* and the ubiquitous *Ageratum mexicana.*

Boababs are a feature of this part of Africa and while trees with a diameter of 10 to 12 feet are common one near the Victoria Falls is 22 feet in diameter! I have seen in Mombasa, specimens up to 18 feet.

From Victoria Falls we went to Livingstone, seven miles away, first for a two hour trip up the Zambesi, then to a Model Craft Village with many interesting exhibits, and finally to the Rhodes—Livingstone Museum which displayed in addition to relics and mementoes of these two great men exhibits of the Bantu people who inhabit the Rhodesias, their customs, implements, clothing, etc. I might here mention that their wood carving is very well done and the Curio sellers do a roaring trade in all tourist centres; the Curio sellers at the Falls have excellent representations of wild animals—though some exaggerated peculiarities make the poor animal a caricature of itself.

We travelled to Lusaka, the Capital of Northern Rhodesia, on our way to Kariba which has been called ''the most ambitious engineering scheme''. This immense man-made lake imprisons the Zambesi and releases a miserable stream from the base of the Dam. It has been calculated that at flood tide, when the six gates release water, the volume is more than that of the Victoria Falls. Unfortunately not one gate was discharging when we were there. As far as the eye can reach is one stretch of water.

From Kariba we drove back to Salisbury where we stopped over Sunday and Monday, looked over Ewanrigg again and left on Tuesday for Umtali on the Portuguese border of Mocambique. From here onwards to Cashel, where we stopped the night at the Black Mountain Inn, the weeds were very beautiful and I noted a *Melastoma,* very near *Tibouchina semi-decandra* but slightly paler and carrying bunches of flowers, a *Hypericum, Iboza* in white and two shades of mauve, *Leonitis* in addition to the normal orange, white and pale salmon pink, and many of the *Labiateae.* The scenes were beautiful in spite of the fact that in the first 36 miles you encountered 800 curves and bends! We passed over the Birchenough Bridge, the third largest single span Cantilever Bridge in existence! Then to Fort Victoria which we bypassed so as to get to Zimbabwe before it became dark. It was now 4:30 p. m. and Zimbabwe was only 17 miles away. The car was parked at the base of the hill and I started up the slope which had steps, with a two-inch rise, but had to stop three times for breathers!—blowing like a porpoise—! We looked over the stone work, the original wall made up of neatly dressed stone tiles laid without mortar and fitting perfectly. Other repairs, and walls, were not so well done. The general theory is that the ancestors of the Bantu built Zimbabwe but that a race, who since time immemorable have built daub and wattle rondavels, should suddenly develop a genius for building quite a distinct type of building—with stone, perfectly dressed and with no practice, seems a little incredible.

This was the end of the trip and I said goodby to my son and family who drove down to their home in East London; the following day I was taken by a friend to Salisbury.

I could have amplified the article by relating incidents that have been omitted owing to lack of space.

## 1963 TRIP TO THE MEXICAN WEST COAST

Katherine L. Clint, *Brownsville, Texas*

Although we had heard of ''*Zephyranthes*'' *tepicensis,* it was only vaguely and we knew very little about it. During conversation with Drs. Walter S. Flory and R. O. Flagg while on a trip through Mexico with them in 1961 we learned that this species reportedly ''had no tube.'' My interest quickened—''Why, that sounds like *Habranthus!*'' None of us had seen the species but were now headed for the area where it was discovered: the ''Territory of Tepic,'' for we were driving from Guadalajara through Tepic to San Blas, on the Pacific. It was a disappointing trip insofar as *Zephyranthes* were concerned, for it was bone dry all the way to the Pacific. Just north of Tepic, we questioned a nurseyman about *Zephyranthes* and *Hymenocallis* and were told that they both bloomed with the ''first thundershowers, about the first week in July.'' We left our name and import number and asked that he collect some of both bulbs and send them to us, but he never bothered to do so.

Subsequently, Drs. Flory and Flagg received one bulb of ''*Z.*'' *tepicensis,* bloomed it and in April, 1963 sent it on to us. It was a small bulb with very narrow, fine leaves. Surely this is not *Habranthus,* I thought. Yet when the bulb bloomed, the small, delicate flowers certainly looked like *Habranthus* to me. One lone bulb plus a small offset (more or less on loan) and a few tiny seedlings were wealth indeed, but the itch to collect the species in its native habitat was too great to ignore, so our 1963 trip to Mexico was planned and timed with this the prime objective. Available weather data and collecting dates from Herbarium data supplied by Dr. Flory seemed to coincide with the information supplied by the nurseryman near Tepic.

It was decided to drive from Brownsville to Mazatlan via Saltillo, Torreon and Durango, then south along the coast through Tepic and on into Guadalajara. We left Brownsville on July 9. Our first misgivings came when we noted signs of long and abundant rainfall just west of Durango. With the appearance of *Milla biflora* in abundant bloom we knew that chances of finding any of the *Zephyranthes* or their kin in flower was mighty slim. However, Durango rains began in June, so perhaps it will be dryer as we go west. Instead, it was greener! When we turned south from Mazatlan, we were again optimistic that we might find it dryer farther south, but it was greener than ever. In Tepic we learned that normally the first showers appear about May 15, with the ''rains'' starting around June 15, instead of the first of July. This year they had arrived even earlier. In spite of this knowledge, we actually did not give up hope of finding *H. tepicensis* in leaf until we were almost into Guadalajara, for Morris can spot rain lily leaves no matter what odds are against him.

This great disappointment did not keep us from enjoying the things we did find in bloom: *Hymenocallis horsmanii* (?) was heavily in bloom from Mazatlan almost into Guadalajara. Primarily an upland species, flowering bulbs were seen in almost every conceivable environment and from elevations of 300-400′ up to 4500′ or more: on low ground in a *Sabal rosei* thicket, growing in standing water in a low bar pit below the highway, on sloping pastures, on mountain ledges, on high banks of small, seasonal streams. One of the strangest sights was a small, sugar-loaf hill which was a mass of white from top to bottom. *Milla biflora* was much in evidence everywhere. We saw *Bessera* in bloom for our first time, lovely violet purple ones on a hill not far from Mazatlan, the usual red ones farther south and east. A sight we shall long remember was the picture of the blooming of a small blue and white irid, literally covering the landscape. Just before entering the state of Jalisco we ran across a thrilling sight: a small rocky gully with clear, running water literally choked with bulbs of our *Hymenocallis* No. 658. The open flowers had been ruined by rushing floodwaters the night before. We had originally collected this species in 1955 northeast of Guadalajara in a similar rocky stream. We wondered if we should also find our *Hymenocallis* No. 604 in bloom. We did find them in some number, but not until the next day, north and east of Guadalajara. Apparently, No. 604 does not extend into the western Sierras, nor did we find *H. horsmanii* east of these same Sierras. These two species are slightly similar in leaf and bulb, but when found in bloom one could never mistake them for the same species.

As we left Guadalajara (via Mexico 110 to Irapuato, thence on Mexico 45 to Queretaro) we soon entered the area we considered home base for *Zephyranthes,* Central Mexico, and we began to find *Zephyranthes* once more—in leaf only, for the season was long over. Even in this territory we found many former collection spots completely barren of *Zephyranthes* above ground.

The final highlight of the trip was finding the blue cenizo in bloom near Cuidad del Maiz. It was a beautiful sight. A different species from those seen in Texas and north Mexico and very rare, these compact bushes were masses of true royal blue flowers. More important, bloom had been under way long enough for a few ripe seed to be found. Thus, each trip has its compensations.

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## IN MEMORIAM—GEORGE HOWARD HAMOR (1887-1962)

The members will be saddened to hear that George Howard Hamor died at Homestead, Fla., May 9, 1962. He was helpful to the other members of the Society in obtaining stock of *Zephyranthes bifolia,* and he was the first to establish the native habitat of this species (see Herbertia 9: 60—62, 1943). He also contributed notes on *Pyrolirion flava* (see Herbertia 12: 136—137. 1945). See Brittonia 5: 204—207, with portrait, 1963, for a brief biography.

## IN MEMORIAM—WILLIAM P. BAIN

We are sad to record the death of William P. Bain on December 3, 1962, at Mobile, Alabama. He was an accredited Official Amaryllis Judge, and a great amaryllisarian who worked with his wife on the favorite plants for many years. At his death they were cultivating about 300 potted Dutch named hybrids. His widow, Mrs. Bain, will carry on with Amaryllis.

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## MRS. A. C. PICKARD HONORED

In 1957 the Houston Amaryllis Society was organized with Mrs. A. C. Pickard as founder and first president. The objectives of the Society are ''Knowing, Growing, Showing and Sharing.'' The activities of the Society have very greatly stimulated interest in Amaryllis in the Houston area. Realizing that Mrs. Pickard has been responsible in great measure for this progress in the appreciation of Amaryllis, she was awarded a Life Membership in the Houston Amaryllis Society and a handsome engraved bronze plaque for her loyalty and faithful service to the organization in 1963.

Mrs. Pickard is the Official Amaryllis Instructor for the Houston Area, and has formed the Houston Council of Judges for the Houston Amaryllis Society. Mrs. Pickard is also a member of the National Amaryllis Judges Council, which includes the Official Amaryllis Judges from all the regions of the United States. In recognition of her services on the National level, the other members of the Houston Amaryllis Society voted her a Life Membership in the American Amaryllis Society, which is affiliated with the American Plant Life Society.

Fig. 2. Presentation of the 1963 William Herbert Medal to Mr. W. D. Morton, Jr., by Mrs. A. J. Haydel.

## PRESENTATION OF HERBERT MEDAL TO W. D. MORTON, JR.

Mr. W. D. Morton, Jr., Registrar of the American Amaryllis Society, which is affiliated with the American Plant Life Society, was presented the Society's William Herbert Medal for 1963 for his outstanding contributions toward the advancement of Hybrid Amaryllis as reported in the 1963 Amaryllis Year Book.

The award was made at a dinner in Lenfant's Restaurant sponsored by the Garden Circles Amaryllis Club, Saturday night, Jan. 20, 1963, which was also attended by members of the Men's Amaryllis Club of New Orleans. Mrs. A. J. Haydel, a national amaryllis judge, and former president of the Garden Circles Amaryllis Club, made the presentation. She also read the citation from National Headquarters of the American Amaryllis Society, affiliated with the American Plant Life Society.

## TRAUB'S "THE GENERA OF AMARYLLIDACEAE"—A REVIEW

Wyndham Hayward

An essential tool for the advanced research worker and a helpful and interesting guide for the amateur fancier in the Amaryllis family of bulbs has at long last arrived in Dr. Hamilton P. Traub's new monograph on "The Genera of Amaryllidaceae." (American Plant Life Society, Box 150, La Jolla, Calif., 1963, 85 pages, paper-board covers, price $5.00.)

It is no discredit to Dr. Traub to say that this work is long overdue, has been for many years, in fact is the only monograph on the Amaryllids in English since Baker's "Handbook of the Amarylleae" published in 1888, now long out of print and very scarce, occasionally found in European catalogues at $25 per copy or more. It supplants, of course, the Pflanzenfamilien monograph in German on the Amaryllidaceae by Pax and Hoffmann, latest edition, about 1930.

No complete monograph of *Amaryllidaceae,* species as well as genera, has been attempted since Baker's Handbook, and that is one of the next things on Dr. Traub's agenda, as he has recently outlined. Besides the Pax-Hoffmann work and Baker there is only William Herbert's limited volume on the Amaryllidaceae which appeared in 1837.

This new "Genera of Amaryllidaceae" is the fruit of half a century of Dr. Traub's study, wisdom and judgment in the field of his favored bulb family. The grouping of this family which he has presented in this work provides the most modern and scientifically conceived treatment of this horticulturally important segment of plant life, and will raise the eyebrows of even the most up-to-date taxonomists in some regards. It will furnish the means to a better understanding of the relationships within this major family for the new student as well as explaining many perplexing problems which the veteran trained plant scientists have encountered. One may say that a true and logical concept of modern Amaryllis family fundamentals cannot be reached without reference to Dr. Traub's latest work.

## EDITOR'S MAIL BAG

Mr. James T. Potter, 18 Rowan Place, Doubleview, Western Australia, writes under date of May 5, 1963, that he is interested in the breeding of *Amaryllis* and other amaryllids, and would be pleased to correspond with breeders in the United States and elsewhere. He is interested in exchanging Blandfordias and other Australian wild flowers, and various amaryllids which he has under culture, for *Amaryllis* and other amaryllids.

Your editor enjoyed a visit from Mrs. Walter D. Wells, Sr., Houston, Texas, of the Greater Houston Amaryllis Club; and Mrs. Esther Harris, of Riverside, Calif., on July 8, 1963.

Dr. Paul Carpenter Standley, born 1884, noted authority on the tropical flora of America, died June 2, 1963, at Tegucigalpa, Honduras.

## IN MEMORIAM—CECIL AND ETHEL O. HOUDYSHEL

It is with the deepest sadness that we report the death of Cecil Houdyshel and his wife, Ethel O. Houdyshel. Mr. Houdyshel died on Thursday, May 7, 1964; his wife had died on February 17, 1964. Mr. Houdyshel received the WILLIAM HERBERT MEDAL in 1938 (see HERBERTIA 1938, pp. 70-75, for his biography).

The members will be pleased to hear that Mrs. Virginia L. Richter, Mr. Houdyshel's grand-daughter, and her brother, Mr. Gordon W. Brooks, will continue the Houdyshel business uninterrupted at 1412 3rd St., La Verne, Calif. Mrs. Richter reports that they will miss her grand-father's ready wit, advice and knowledge.

## LINEAGICS

''Lineagics'', by Hamilton P. Traub, 145 pages, 8 illustrations, $5.00 postpaid, is now available. This is a brief outline text which was prepared for those members of the Society who are interested in what was formerly known as biosystematics, the science concerned with the grouping of organisms into lineages. The text is divided into four parts: (a) the history of lineagics, and lineagics as an integrated science; (b) basic lineagics; (c) applied lineagics, and (d) research methods in lineagics. This outline text may be obtained from the Executive-Secretary, Dr. Thomas W. Whitaker, Box 150, La Jolla, Calif.

# 1. REGIONAL ACTIVITY AND EXHIBITIONS

## THE PALESTINE (TEXAS) AMARYLLIS SOCIETY

Mrs. Arcola N. Herrington, *Secretary*

The Palestine (Texas) Amaryllis Society was organized as an affiliate of the American Amaryllis Society on January 8, 1963 with five members which has grown to ten members at this writing (Aug. 18, 1963).

The members meet every first Tuesday at 3 p. m. at the home of one of the members. At each meeting the topic for discussion is some phase of Amaryllis breeding and growing. Light refreshments are served. During the autumn we will have speakers at some of the meetings. We study the Amaryllis Manual by Dr. Traub, and follow the directions given by various dealers in Amaryllis. We have completed our new Year Book and these will be presented to each member. We are enthusiastic about our future plans.—*839 Tennessee Ave., Palestine, Texas.*

## SAN ANTONIO JUDGES COUNCIL ORGANIZED, 1963

Mrs. Robert E. Herold, 203 Cromwell Dr., San Antonio, Texas, reports that the San Antonio Judges Council of Nationally Accredited Amaryllis Show Judges was organized on September 24, 1963; Pres., Mrs. Edward Story, V-Pres., Mrs. Robert E. Herold, Sec.-Treas., Mrs. Robert H. Parkinson. She also reports that an Amaryllis Society will be organized on a later date.

## HATTIESBURG AMARYLLIS SOCIETY

Mrs. R. A. Fowler, *P. O. Box 670, Hattiesburg, Mississippi*

Our Amaryllis Show had to be canceled on account of the severe winter weather which damaged many of our bulbs. We are planning an Official Show for 1964. We have learned much about overwintering Amaryllis bulbs as a result of the extreme cold weather of the past two winters.

## 1963 AMARYLLIS SHOWS

In spite of the severe cold weather of the past two years, most of the local Societies were able to hold creditable Official Amaryllis Shows in 1963. These are grouped in the order in which they were held from March 30 to April 27-28.

# OFFICIAL MEN'S AMARYLLIS CLUB SHOW, 1963

WALTER R. LATAPIE, *Show Standards Chairman*

The Men's Amaryllis Club of New Orleans held their Sixth Annual Show on March 30th and 31st, 1963. In spite of the second severe winter in the City of New Orleans large quantities of Amaryllis were exhibited. Comments continue to come in, indicating that we had again scored a huge success for our efforts.

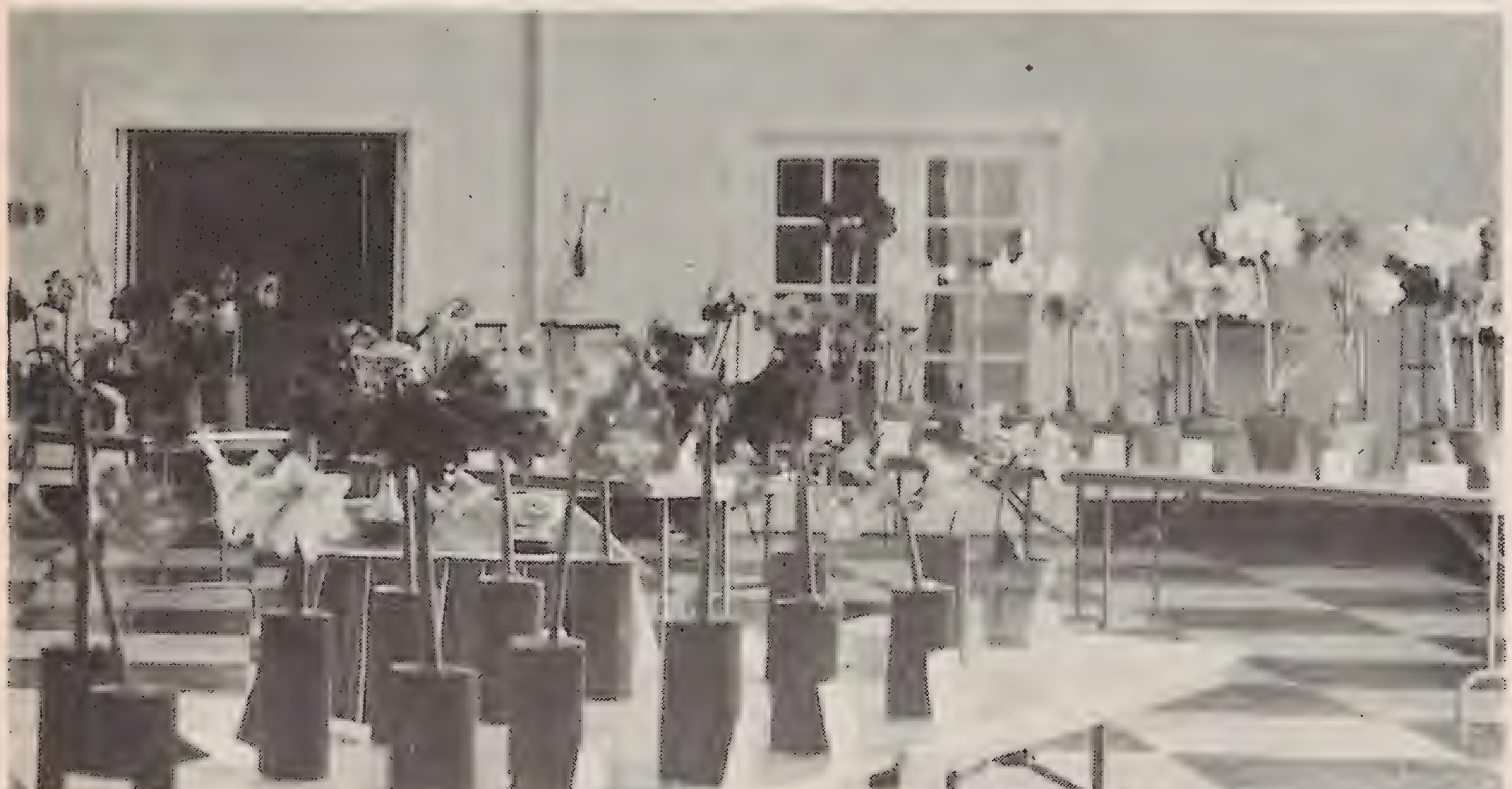

Fig. 3. Partial view of exhibits at the 1963 Official Men's Amaryllis Club Show, New Orleans, La.

Registered attendance was in excess of 600. As in the past, a number of out-of-town visitors also enjoyed our flowers. They came from Baton Rouge, Prairieville, Hansville, Luling, Thibodaux, Raceland, Belle Chase, Bastrop, Shreveport, Covington, Destrehan, Port Sulphur, in Louisiana. From out of the state, Amaryllis lovers came from Mobile, Ala., Gautier, Miss., and Dothan, Ala.

Awards in the horticulture section were received by: A. J. Haydel, the Jessee Nursery award, Tri-color winner in Dutch Hybrid class; Melvin Zwicke, the Reuter Seed Co. and T. T. Swetman trophies for sweepstakes in Dutch Hybrid class; Mrs. John Klein, Jr., Newsham Becnel Tri-Color winner in American; Stephen Gasperecz, The Men's Amaryllis Club award, most blue ribbons won by a member; and Santo Cuchinotto, sweepstakes winner, most blue ribbons, American.

Awards of Merit of the American Amaryllis Society were received by: Jerome E. Peuler, 'Love's Desire'; Melvin A. Zwicke, 'Golden Triumphator'; Melvin A. Zwicke, 'Siren'; Mrs. John Klein Jr., 'Halley' and Stephen Gasperecz, 'Little Sweetheart'.

Preliminary Commendations were awarded to: Milo C. Virgin (2), Mrs. Walter Gonzales, and Stephen Gasperecz.

Mr. Frederic Schmitz, Assistant Professor of Horticulture, Plaquemine Parish Experimental Station, Diamond, La., showed colored slides and held discussions on Amaryllis during the afternoon of Sunday March 31st.

Chairman of the Show was Vincent J. Peuler, and Co-Chairman was Barry W. Clark.

## 1963 COASTAL BEND AMARYLLIS SHOW

MRS. CARL C. HENNY, *P. O. Box 3054, Corpus Christi, Texas*

The Coastal Bend Amaryllis Society held their annual show in conjunction with the Lola Forrester Flower Show, in Corpus Christi, Texas, March 30th and 31st, 1963. The Theme of the flower show was "Heaven's Above—Zodiac".

Mrs. Rudolph Studer, staging chairman for the Amaryllis Society, prepared twelve posters depicting all the signs of the Zodiac, with planting instructions for each period of time. She also displayed large oil paintings of several types of hybrid amaryllis which helped to make the display more attractive. Mrs. Studer, being an artist, painted these pictures in oil from slides which were taken of the amaryllis while in bloom.

Mrs. L. Materne was awarded the (Ludwig Cup) Ludwig's Challenge Trophy for her display of Ludwig's Streaking Stripes—potted bulb—which received the highest score in the potted plant section of the Ludwig bulbs exhibited. Mr. Reed Rogers received a Silver Trophy for 'Ludwig's Dazzler', highest scoring cut scape in the registered amaryllis section.

Only 94 specimens were entered this year, due to reverse weather conditions in this area. Corpus Christi suffered five northers of freezing and below freezing temperatures, which damaged and retarded many of our plants. Therefore, our society did not have National Judges to attend the show to judge our specimens, as there were few which were worthy to be judged. Local judges judged our entries for the show. We hope that we will have better luck with our entries during the coming year—spring 1964.

## FIRST OFFICIAL SHOW, GREATER HOUSTON AMARYLLIS CLUB 1963

MRS. W. S. WHEELER, *President, 4506 Bellaire, Bellaire, Texas*

The Greater Houston Amaryllis Club of Houston, under the chairmanship of Mrs. Walter D. Wells, Sr., presented its First Annual Amaryllis Show of April 6-7, 1963 in the Garden Center.

The theme of the show was ''Amaryllis on Tour'' honoring our neighboring Gulf Coast clubs.

Seven arrangements were displayed on pedestals by:

Mrs. Jesse Haver, honoring Corpus Christi, ''Sailing Sailing''
Mrs. B. A. Russell, honoring Dallas, ''Big D''
Mrs. Z. K. Toliaferro, honoring Hattiesburg, Miss., ''Plantation Days''
Mrs. Walter D. Wells, Sr. honoring Mobile, Ala., ''A Southern Port''
Mrs. Henrietta Taylor honoring New Orleans, La., ''The Crescent City''
Mrs. R. C. Willie, honoring San Antonio, Texas, ''A Japanese Garden''
Mrs. Clint R. Black, honoring Valdosta, Georgia, ''Southern Hospitality''

All arrangements were made using one or more amaryllis. They added much beauty to our show.

The judging was done by official Amaryllis judges, and ten silver trophies were awarded to exhibits that merited them. Award of Merit for 'Floriade' (Warmenhaven), the most outstanding potted horticultural specimen of the show, was made to Mrs. Walter D. Wells. Also, a silver trophy was awarded to Mrs. Wells. Other top awards were made to Mrs. W. S. Wheeler, Mrs. Clint R. Black, Mrs. R. A. Fawcett and Mrs. Charles Pease.

An important non competitive feature of the show was the educational display on the growing of *Amaryllis* from clone with ripened seed pods to blooming clone step by step. This display created quite a lot of interest and comments from the newly interested public. Members of our organization gave first hand information to our interested guests on buying, and from what nursery in Holland the bulbs may be purchased.

*Amaryllis* lover members of Amaryllis clubs from cities in the surrounding area, along with many local enthusiasts, viewed the show and expressed their pleasure and congratulations for one of the outstanding amaryllis shows in Houston.

# GARDEN CIRCLES AMARYLLIS CLUB OFFICIAL SHOW, 1963

Mrs. A. J. Haydel, *516 Gordon Ave., New Orleans, Louisiana 70123*

The Garden Circles' Amaryllis Club of New Orleans is affiliated with the American Amaryllis Society, also a member of The Federated Council of New Orleans Garden Clubs, The Jefferson Parish Council of Garden Clubs and the Louisiana State Federation of Garden Clubs.

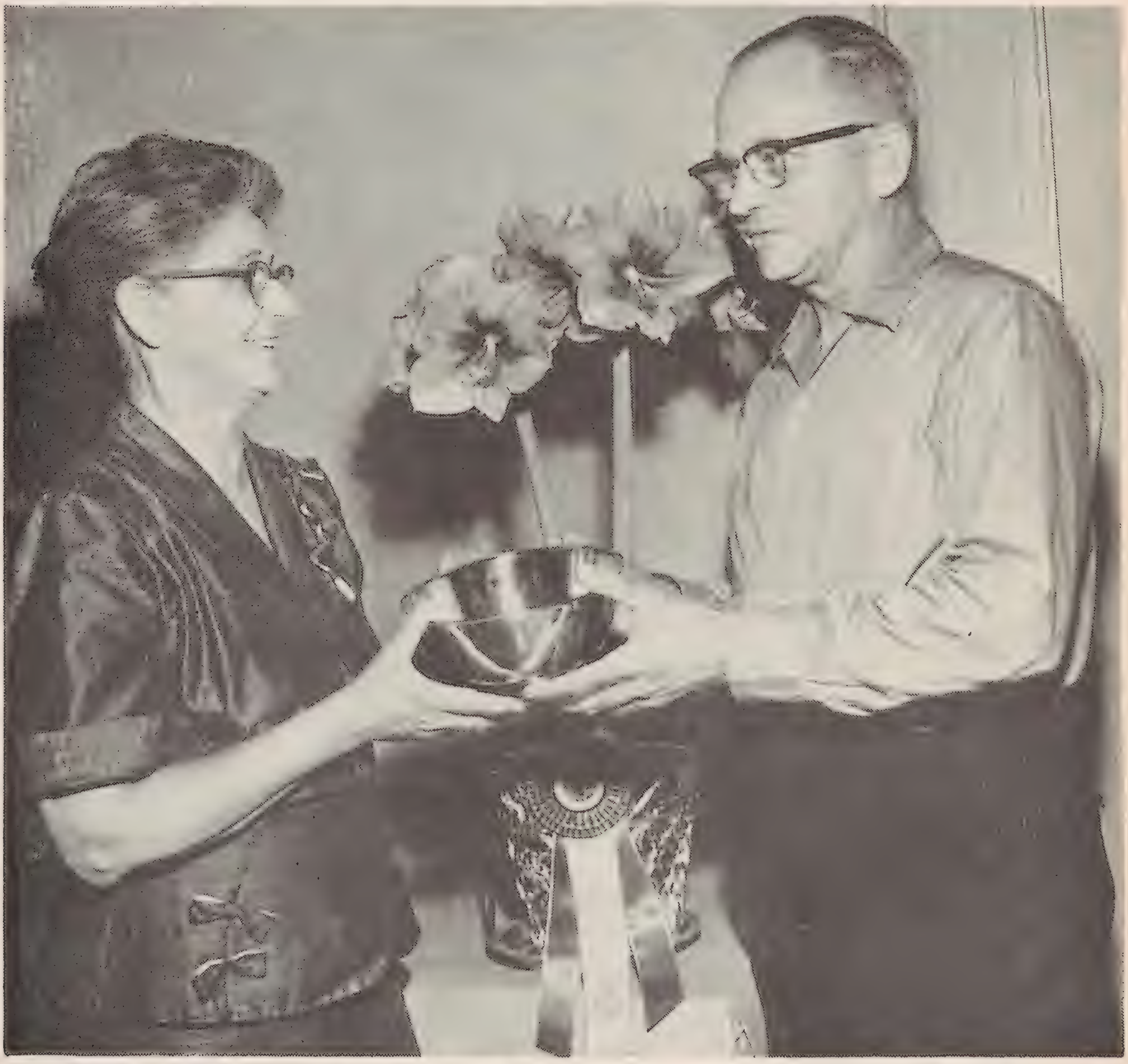

Fig. 4. Presentation of the Tricolor Award to Mr. James E. Mahan by Mrs. A. J. Haydel at the 1963 Official Amaryllis Show of the Garden Circles Amaryllis Club.

Mrs. A. J. Haydel was show Chairman, Mrs. John Klein, Jr. was honorary Chairman.

The show was judged by accredited Amaryllis judges.

The Garden Circles' Amaryllis Club sponsored the Official Horticulture Amaryllis Show at Reuter's Seed Co. 320 N. Carrolton Ave. The show was opened to the public Saturday April 6 from 3 to 5 P.M. and Sunday April 7 from 8:30 A.M. to 5 P.M.

The Tri-Color was won by Mr. James E. Mahan on his ''Queen of the Pinks''. Another top winner in the show was Miss Antoinette Weed who won the Harry St. John award for the most outstanding registered American Specimen. Mr. Santo Cuchinatto, recipient of the Sweepstake award for the most blue ribbons in the American Horticulture Division. Mrs. Walter R. Latapie won the sweepstakes award in the Dutch Horticulture. Mrs. Harry St. John for the best American Seedling.

The Preliminary Commendation Awards from the American Amaryllis Society went to Mrs. Harry St. John, Mrs. A. J. Haydel, Mrs. Lewis Lloyd, Mr. Milo C. Virgin and Mr. E. M. Beckham.

The Awards of Merit from The American Amaryllis Society went to Mrs. A. J. Haydel, Mr. James E. Mahan, Mr. Melvin Zwicke and Mr. E. M. Beckham.

Blue Ribbon winners in Dutch Horticulture were Mrs. Miriam G. Authement, Mrs. A. Autry, Mrs. A. J. Haydel, Mrs. Harris Hebert, Mrs. John Klein, Jr., Mrs. Walter R. Latapie, Mrs. Lewis Lloyd, Mr. A. R. Oddo, Mrs. W. J. Perrin, Mr. E. M. Beckham, Mr. Barry W. Clark, Mr. James E. Mahan, Mr. George Mertz Jr., Mr. Milo Virgin and Mr. Melvin Zwicke.

Blue ribbon winners in the American Horticulture Division were Mrs. Harris Hebert, Mrs. John Klein Jr., Mrs. Miriam G. Authement, Mrs. Harry St. John, Mrs. Walter R. Latapie, Miss Antoinette Weed, Mrs. Charles F. Durr, Mr. Santo Cuchinatto and Mr. Toby Mullen. Entry was open to all Garden Clubs and Non Gardeners.

There were six invitational arrangements displayed on pedestals by non-competitive guest artists who were Mrs. V. P. Grundmann, Mrs. F. J. Cuguet, Mrs. Robert Larue, Mrs. Russell Kullman, Mrs. Wayne E. Williams and Mrs. Tully Ward.

There were 250 entries in Horticulture and over 750 attended the show. There were a number of visitors from out of State.

The all Horticulture Amaryllis Show of New Orleans was displayed by Divisions 1 to 9 and by Growers.

## VALDOSTA (GA.) OFFICIAL AMARYLLIS SHOW, 1963

Guy Rice, *606 Gornto Road, Valdosta, Georgia*

The Official Valdosta Amaryllis Show of 1963, sponsored by the Men's Garden Club of Valdosta, was held on Saturday-Sunday, April 20 and 21, 1963. Mrs. Richie Rosa of Tallahassee had the best horticultural entry—a huge pot of white Amaryllis in full bloom, which was held at the Valdosta Garden Center auditorium. This is the 7th show staged in cooperation with the American Amaryllis Society.

The judges were well pleased with the quality of the Show in spite of the fact that due to the severe cold of the past winter many fine bulbs had been lost. There were not as many entries under named clones, but the quality of all of the blooms was excellent. Growers from several south Georgia and north Florida cities brought their blooms to the show.

Winners in the Court of Honor, the top entries were, in addition to Mrs. Rosa, William Hart, with 'Picotee' for the best named clone in a pot; Mrs. Willis Register, with a light red bloom in a pot; Mrs. Mary Newton, with a red bloom with star in a cut scape; Dr. Gregg Smith, with a white with red stripe for the best entry in the hybridizer's class, cut scape; and Mrs. Leonard Mederer, with an orange red seedling, for award in hybridizers class, in a pot.

Many other blue ribbons were awarded. Robert D. Goedert, of Jacksonville, Fla., received a green ribbon for his outstanding commercial exhibit.

## 1963 OFFICIAL HOUSTON AMARYLLIS SOCIETY SHOW

Mrs. A. C. Pickard, *Official American Amaryllis Society Show Standards Chairman, 1702 N. Blvd. Houston 6, Texas*

The spacious Houston Garden Center auditorium was turned into an Amaryllis heaven on April 21, as more than 1000 Sunday visitors toured the Third Official Show of the Houston Amaryllis Society.

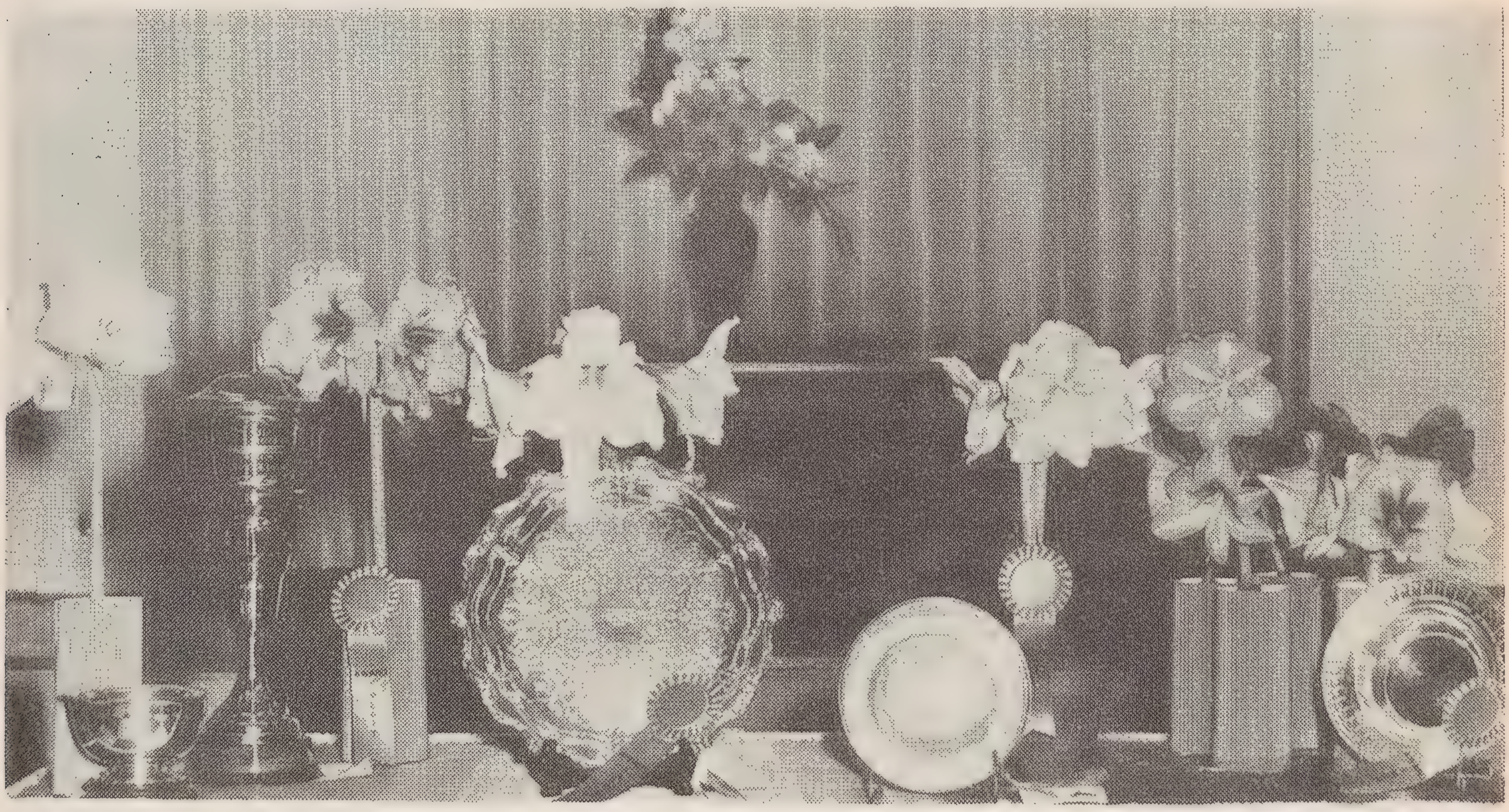

Fig. 5. Trophy table and winning award specimens at the 1963 Official Houston Amaryllis Society Show.

Modern arrangers interpreted the theme of the show "Forecast of the Amaryllis" with five classes, namely "Signs of the Zodiac," creating exciting experiences in color sensation with Amaryllis flowers predominating.

There were invitational classes in Artistic and Horticulture classes. This was a standard competitive specialty show, judged by National Accredited Flower Show Judges in the Artistic Division, and the Horticulture sections judged by Accredited National Amaryllis Judges.

The Educational section included the Life Cycle of *Amaryllis* from seed to clone and all methods of vegetative propagation with examples of planting and information thereof.

Five American Amaryllis Society awards in Horticulture were awarded to the meritorious exhibits. In addition to the ribbon and awards of merit, five silver perpetual trophies were awarded to their winners. These trophies are perpetual and may be kept permanently by exhibitor when won two (2) consecutive years or three (3) times at intervals.

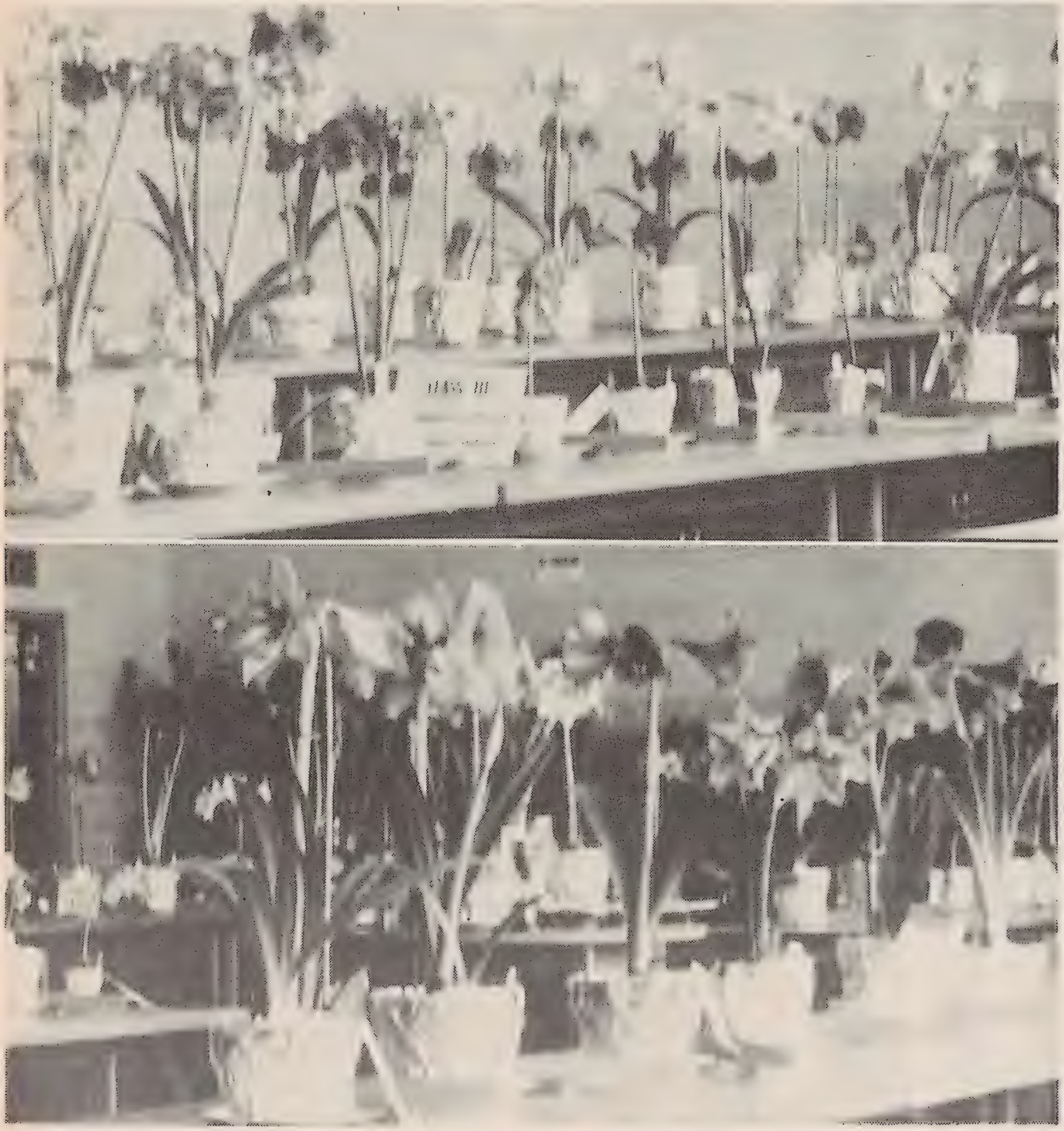

Fig. 6. Partial view of exhibits at the 1963 Official Houston Amaryllis Society Show.

Top award winners were Mr. Kermit Warnasch, Mrs. A. C. Pickard, Mrs. M. E. Shelton. A number of blue ribbons were given in the different divisions and classes as the Houston Amaryllis Society followed the official rules of the "American Amaryllis Society."

Awards of Merit and Preliminary Commendations were given as follows: 'Anna Paulowna' (WSW), A. M.; 'Beacon' (Warm.), A. M.; and 'Bouquet' (Lud.), A. M., Mrs. A. C. Pickard; 'Home Decorator' (Lud.), A. M. & Ludwig Cup, Mrs. M. E. Shelton; 'Marion' (WSW), highest A. M., Mr. Kermit Warnasch; 'Sight Show' (Lud.), A. M., and 'Superba' (VM), A. M., Mrs. A. C. Pickard; and Breeders Class, Dutch Seedlings, P. C., Mr. Kermit Warnasch.

In the Artistic division, Mrs. C. R. Swanson took top honors with Mrs. W. L. Offenbacher second. Guest entries were given special awards.

Mrs. W. W. Cone, General Show Chairman, was elected President for 1964.

## 11th OFFICIAL GREATER GULF AMARYLLIS SHOW, 1963

WILMER R. SMITH, *General Show Chairman, Mobile, Alabama*

The Amaryllis Society of Mobile staged their Eleventh Annual Greater Gulf Amaryllis Show April 27 and 28, 1963 in Mobile, Alabama. This is an Official Amaryllis Show staged under the standards of the American Amaryllis Society.

The theme of the show was "Amaryllis On The Gulf" which was carried out by having a large sail boat surrounded by baskets of *Amaryllis* as the focal point.

Entries in the show were as follows: American Potted Amaryllis, 48; American Cut Amaryllis, 59; Dutch Potted, by color, 12; Dutch Potted by name, 68; Dutch Cut, by color, 28; Dutch cut by name, 23; Seedlings, potted, 32; Seedlings, cut, 27; and the following single bloom Amaryllis: Dutch by name, 36; American by name, 13; Unnamed Dutch, 22; Unnamed American, 74. Hobby Tables 3. This made a total of 445 entries in the Horticulture Division. We also had 46 Artistic Arrangements and 27 Art Entries. These entries made a grand total of 518 entries in the show.

The show also had four educational tables which created a great deal of interest. Attendance for the two days was well over 3,000 which included many visitors and friends from nearby towns and cities. One thousand program books were given away.

Another feature which was repeated this year was that people attending the show could deposit self-addressed stamped envelopes for free seed when it was ready. We have mailed over four hundred of these envelopes and each one contained several dozen seed. Our program states the object of our show is to present a competitive display of *Amaryllis* that will stimulate and broaden interest in their growth, and to encourage those attending to grow and propagate *Amaryllis* for their enjoyment and cultural benefit. We feel that by giving the seed this helps to carry out the object of the show.

This year we included another new section and that was the Single Bloom Amaryllis, with four classes, Dutch by name, American by name, Unnamed Dutch and Unnamed American. This added interest and we believe it will be even larger next year.

Eighteen accredited judges from Hattiesburg, Mississippi, Pensacola, Florida and Biloxi, Mississippi judged the show, and a total of twenty-two sterling silver awards were made. Mr. W. C. Strain acted as Master of Ceremonies and after making appropriate opening remarks assisted Mrs. A. B. Palmer, Chairman of Awards & Trophies in making the awards to the following:

Mrs. Gertrude Marshall of Gautier, Miss., was sweepstakes winner having won nine of the awards. Of the nine awards three were won by Mrs. Marshall for the third time and therefore became her permanent trophies. Her awards were as follows: winner of the most Blue Ribbons in Show, including Horticultural & Artistic Arrangment Divisions; most Blue Ribbons in Horticultural Division; most Blue Ribbons in Dutch Named Varieties, most Blue Ribbons in Single Bloom named Division; most Blue Ribbons in Combined Dutch Hybrid Potted & Cut Amaryllis Divisions; most Outstanding Horticultural Potted Bulb Specimen of Dutch Amaryllis in Show; most Blue Ribbons in Dutch Hybrid Potted Amaryllis Division; most Outstanding Horticultural Cut Specimen of Dutch Amaryllis in Show; most Blue Ribbons in Dutch Hybrid Cut Amaryllis Division.

Mrs. Palmer awarded trophies to other winners as follows: Mrs. J. C. McRae, winner most Blue Ribbons in Artistic Arrangement Division. Mr. Joe Brummitt, most Outstanding Horticultural Potted Bulb Specimen of American Hybrid Amaryllis in show. Mrs. W. A. McCollum, most Outstanding Artistic Arrangement of Amaryllis in Show. Mrs. Virginia Sherwood for best Painting of *Amaryllis* (Adult Division). Phillip Dubois, best Painting of *Amaryllis* in Junior Division.

The Rose Garden Club was winner in the Invitational Class. Mrs. Melvin Sanders most Artistic Composition of Amaryllis in Show. Junior Trophy for most Blue Ribbons was won jointly by Miss Darby Hickson and Miss Janet McRae. Mrs. R. E. Chason most Blue Ribbons in the Single Bloom unnamed division. Wilmer R. Smith won for the most outstanding Hobby Collection of Amaryllis and also for the most Blue Ribbons in the Unnamed Cut Seedlings.

Mr. W. C. Strain awarded to Mrs. A. B. Palmer two trophies, one for the most Outstanding Horticultural Cut Specimen of American Hybrid Amaryllis in Show and the other for the most Blue Ribbons in the unnamed Potted Seedlings.

At the conclusion of the ceremonies President Dewey Hardy and Show Chairman Wilmer Smith expressed their appreciation to the membership and show entrants for their wonderful cooperation and assistance in putting on a very successful show. Co-Chairmen serving with Mr. Smith were: Mr. J. C. McRae, Mr. Joe Brummitt, and Mr. S. A. Shannon.

At our May 1963 meeting officers were elected to serve for the 1963-1964 term and they are as follows: *President:* Mr. Wilmer R. Smith, Forest St., Chickasaw, Ala. Gl 6-7193; *Vice-Pres.:* Col. Robert Pollock, Brookley AFB, Mobile, Ala. He 8-6011; *Treas.:* Mrs. A. B. Palmer, 301 Hillside Drive, Chickasaw, Ala. Gl 6-7940; *Secty.:* Miss Mildred Laughlin, 701 Dauphin Is. Pkway, Mobile, Ala. 473-7448; *Historian:* Mrs. H. A. Allen, 210 Alpine, Chickasaw, Ala. Gl 6-8525.

We shall resume our regular monthly meetings in September on 4th Monday night, 7:30 P.M. at Garden Center, 1835 Dauphin St., Mobile. For our summer activities we shall have our annual picnic on July 13 at the Municipal Park.

## AMARYLLIS JUDGES CERTIFICATES

Since the last report in the 1963 Amaryllis Year Book (page 35), the following named Amaryllis Judges Certificates have been issued by the American Amaryllis Society—

118. Mrs. Isabel Anderson, A Bar A Ranch, Medina, Texas (Horticulture only).
119. Mrs. E. M. Anderson, A Bar A Ranch, Medina, Texas (Horticulture only).
120. Mrs. Frank Hopwood, 620 Patterson Ave., San Antonio 9, Texas (Horticulture only).
121. Mrs. Bob E. Herold, 203 Cromwell Dr., San Antonio 28, Texas (Horticulture only).
122. Mrs. Paul A. Kane, 1001 McIlwaine St., San Antonio 1, Texas (Horticulture only).
123. Mrs. Larry H. Miller, 115 W. White Ave., San Antonio 14, Texas (Horticulture only).
124. Mrs. Sam C. Montgomery, 140 Harriet Dr., San Antonio 16, Texas (Horticulture only).
125. Mrs. Robert H. Parkinson, 1623 Hillcrest Dr. E., San Antonio 28, Texas (Horticulture).
126. Mrs. Edward T. Story, 307 Northhaven Dr., San Antonio 29, Texas (Horticulture only).
127. Mrs. John C. Watkins, 1910 W. Magnolia Ave., San Antonio 1, Texas (Horticulture only).
128. Mrs. C. R. Frampton, 803 Worthshire Rd., Houston 8, Texas.
129. Mrs. Clint R. Black, 1832 Forest Hill Dr., Houston, Texas 77023.
130. Mrs. Christine Hymers, 3403 Nottingham, Houston, Texas 77005.
131. Mrs. R. A. Wilder, 126 Whipple Dr., Bellaire, Texas.
132. Mrs. Sally Fox, 1527 Castle Court, Houston 6, Texas (Horticulture only).
133. Mrs. Charles H. Pease, P. O. Box 19265, Houston 24, Texas (Horticulture only).

# AMARYLLIS EXHIBIT AT THE ATLANTA FLOWER SHOW, 1963

Beckwith D. Smith, *3479 Rockhaven Circle, N. E., Atlanta 24, Georgia*

The Atlanta Flower Show Association presented their Seventeenth Spring Flower Show at Lenox Square, Atlanta, Georgia, which was held on the Mall in two large tents for horticultural exhibits, and in the Auditorium of Lenox Square for flower arrangements. Two days, April 17-18, 1963. The Show was held in conjunction with the National Convention of Federated Garden Clubs of the United States.

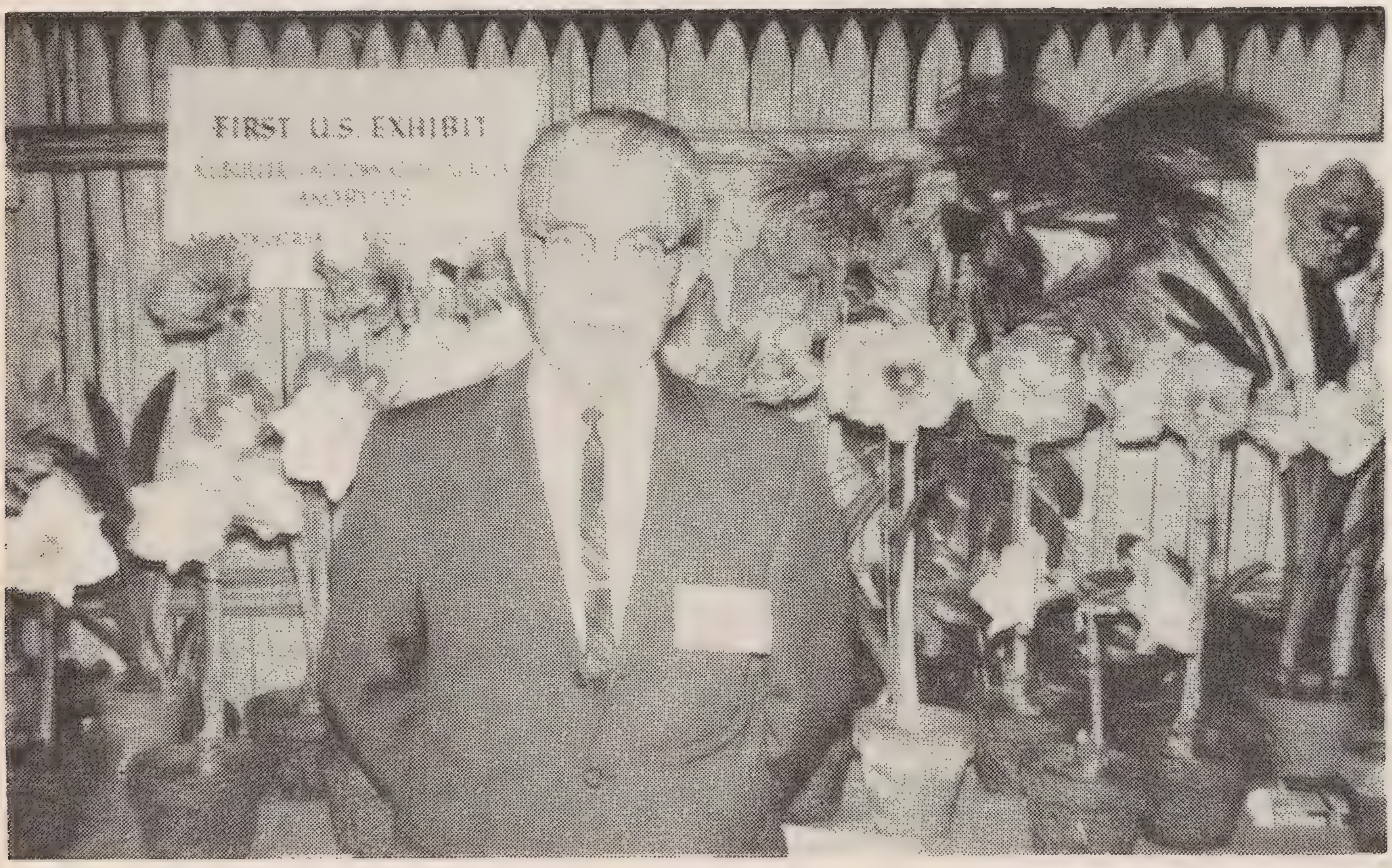

Fig. 7. First showing in the United States of Buller Hybrid Amaryllis at the Atlanta Flower Show, 1963. Mr. Beckwith D. Smith is in the foreground.

Twenty-three pots of A. C. Buller, Cape Town, South Africa *Amaryllis* were exhibited in bloom during the two day show under the Educational Division, which bulbs had been held in cold storage since the fall of 1962 for this purpose. Many expressions were heard from garden club visitors that the *Amaryllis* display was the ''focal point'' of the show. *Amaryllis* for the show were brought into bloom by Beckwith D. Smith.

# THE HOUSTON JUNIOR AMARYLLIS SOCIETY

The Houston Amaryllis Society sponsors a Junior Amaryllis Society.

The Houston Junior Amaryllis Society was organized August 23, 1963 (Friday), in the home of Mrs. W. W. Cone, president of the Houston Amaryllis Society.

Mrs. A. C. Pickard, founder of the Houston Amaryllis Society and now founder of the Houston Junior Amaryllis Society organized and installed the first officers of this Society. Mrs. Pickard is a National Appointive Officer.

These officers will take office for two years:

President, David Koon
Vice-President, Dottie Pearle
Secretary, Debbie Stevenson
Treas., Robert Gunther
Cor. Sec., Bobby Pearle

There are seven members on Roll Call. This age group ranges from 8-14 years old. Three very interested mothers of the children attended this meeting which showed interest in child development as gardeners. Mrs. E. E. Koon is Junior Club Chairman.

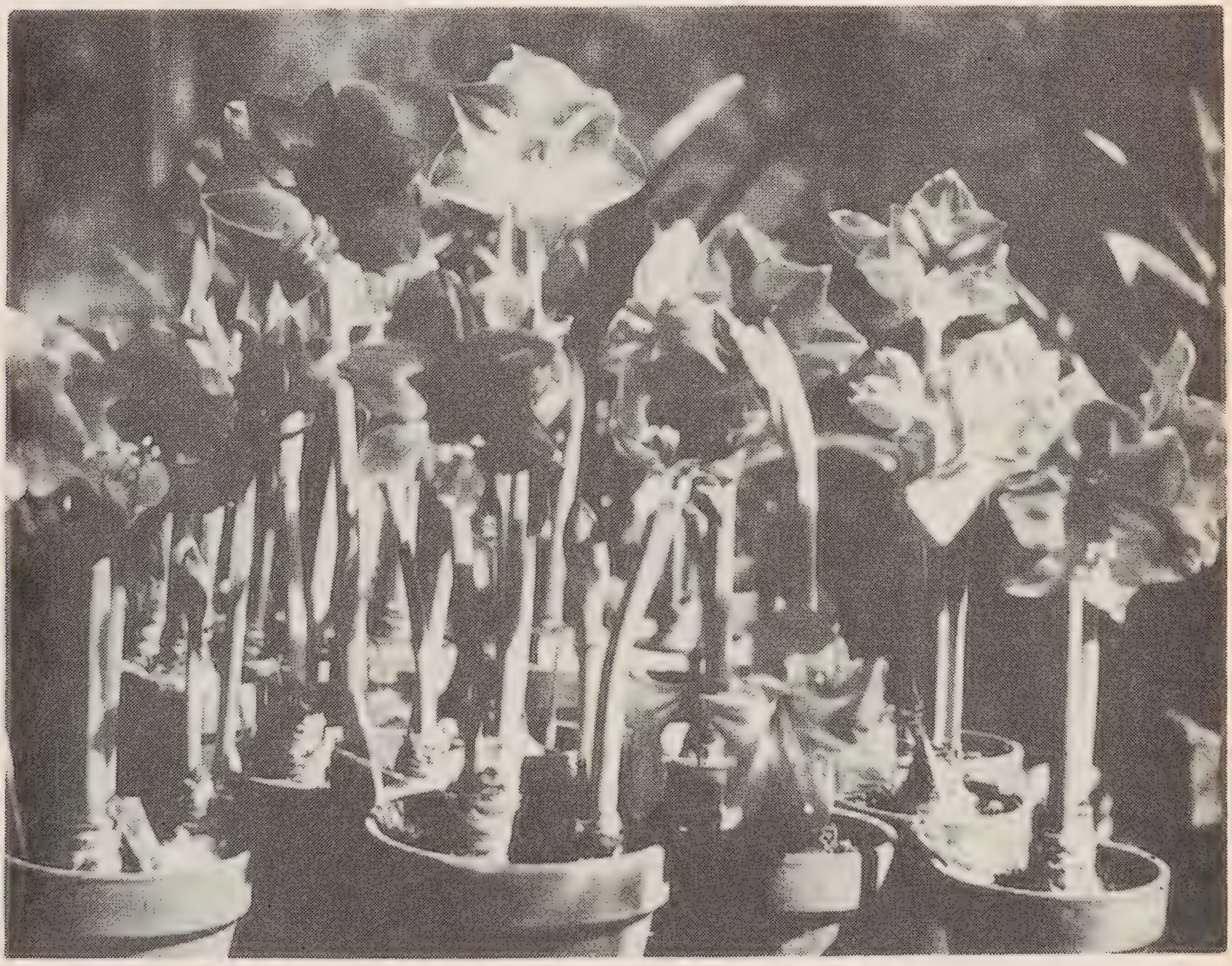

Fig. 8. Buller Hybrid Amaryllis in a group exhibited at the 1963 Atlanta Flower Show—colors: red, wine red, peach, salmon, rose, pink, bicolors, and white.

To be a Charter member one has the month of September to join. Closing date is September 30, 1963. The members of this group are from different areas in the city of Houston; this is not a neighborhood group of children.

Persons applying for membership should be gardeners or interested in becoming gardeners. This is considered a Horticultural Society Organization. Five meetings a year. The mothers suggested this due to bringing the children. Meetings will be held in the evenings, 7 p. m.-8:30 p. m. This organization has no connection with school activities.

This organization is a member of the Texas State Garden Clubs, Inc. and National Council of Garden Clubs. The Junior Society will also include in their program all activities and procedures of a regular Junior Garden Club.

At the August meeting the Houston Junior Amaryllis Society met with the Houston Amaryllis Society and was formally introduced. On this date the children composed a constitution and by-laws, program, projects, etc., as would fit the group and their capabilities. The first Year Book will be ready for the September 30, 1963 meeting.

They will be included in the Spring Houston Amaryllis Society Official Show with a special place for their exhibits.

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(CONTINUED from page 74.)

and with *Z. bifolia* have all failed. Pollen of *H. immaculatus* has not been available, nor has it been possible to cross back any of the seedlings on *H. immaculatus.* Even though we have the sterile form of *Z. bifolia,* this back cross was attempted and failed.

Many of the seedlings have set small offsets at the base of the bulb, but these have been strangely slow, even when removed from the mother bulb.

At this date we cannot report on the performance of this new hybrid under garden conditions. After the disaster of January, 1962 and the damage was discovered, all bulbs were potted as the original six had been, and kept in the greenhouse. We dislike the risk of planting them once more in the shade house (about two miles from our home), nor do we wish at present to trust them to the heavy soil in the garden, though we shall eventually do so.

Two attempts of a repeat cross failed in 1962, probably because improperly stored pollen was used, but we naturally wondered if our first cross was just a lucky one. This year, a heavy rain in late spring gave us a bonanza of flowers on *H. immaculatus* and *H. concolor.* This time we were prepared with lots of fresh pollen, for Morris has learned how to bring flowers on *Z. bifolia* almost at will, any time from late winter until fall. He keeps the pots very much on the dry side, then waters several days in a row, rather heavily.

The following successful crosses were made: *H. immaculatus* x *Z. bifolia, H. concolor* x *Z. bifolia and H. concolor* x *H. immaculatus.* Careful emasculation was carried out in all cases. From general signs and appearances of the growing seedlings, I would say that all three crosses are true hybrids. X. *Sydneya morrisii* was not just a lucky ''take,'' after all.

# 2. LINEAGICS

## [DESCRIPTION, CLASSIFICATION, EVOLUTION, AND PHYLOGENY OF LINEAGES]

# A NEW PORCELAIN PINK LYCORIS

William Lanier Hunt

For ten or fifteen years, I have been climbing up and down a 75 foot hill in the heat of July, August and September to make crosses in the lycoris beds in my wilderness arboretum. As other victims know, the

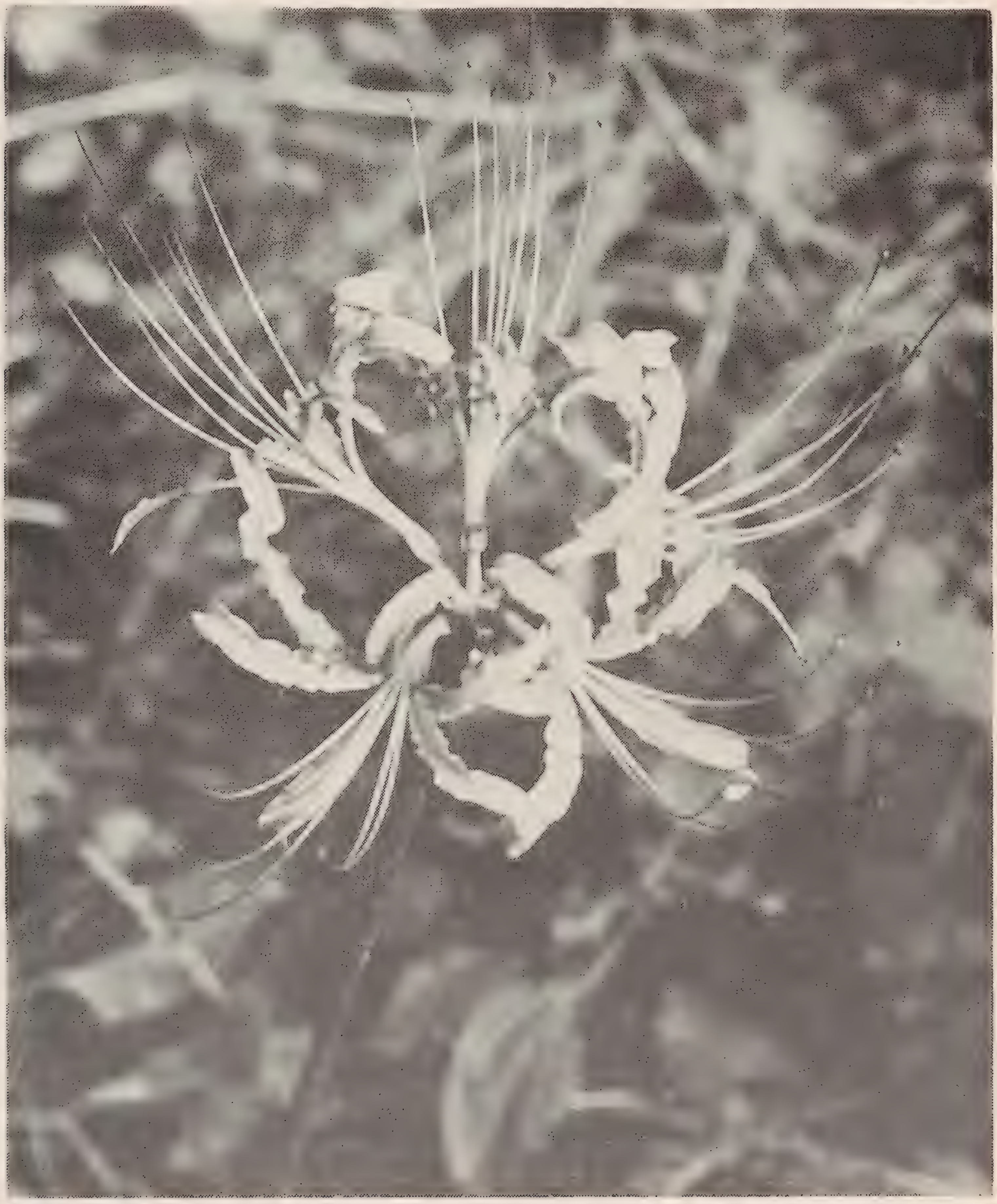

Fig. 9. A pink-flowered *Lycoris,* observed in the garden of William Lanier Hunt at Chapel Hill, North Carolina in 1963. This bulb as well as *L. radiata* were intermixed in a shipment of *L. elsiae.*

combination of 90 degree heat and a bad case of lycorisitis produces definite hallucinations. On certain days, I have been able to conjure up the image of a bright pink—instead of fire red—*Lycoris* seedling as big as *L. elsiae.* This vision has come to me for so many years, now, that when, on September 4th, 1962, I went down to the lycoris beds and saw right before my eyes the very thing about which I had been dreaming, I thought for a moment that heat had got me.

Fortunately for Southern gardeners, this *Lycoris* queen was no illusion. She stood on a 26-inch scape. Her five flowers measured over eight inches across! In a bed of *L. elsiae,* she stood out like a pink gem.

Individually flowers of this new lycoris are wider and the tepalsegs longer even than those of *L. elsiae,* making it a dramatic flower indeed. The color is a bright, slightly dusky pink: ''Porcelain Rose'', H.C.C. 620 down the middle of the tepalsegs, with a band of 620/1 on each side. *L. elsiae* is so delicate that it does not stand up to summer rains very well —especially in the hurricane season—but the new pink flower stood up well to an all-night downpour. Her color never faded until the last few days when it lightened slightly to a beautiful soft pink.

The appearance of this bright pink *Lycoris* in a shipment of *L. elsiae* and the occurrence of *L. radiata* in the same batch of bulbs (they bloomed at the same time, and, oh, how different they were!) seems to point to a possible *L. elsiae x L. radiata* cross. This was the very way I had contemplated creating this beauty. Has this wedding taken place in Japan whence these shipments come? Anyway, it might have taken at least five years to accomplish it from seeds.

Surely this experience and those of Mr. Caldwell, Mr. Morrison, Mr. Hayward, Mr. Houdyshel and others will make us all the more eager to import bulbs in quantity to see what we will get. Perhaps this large pink *Lycoris* has already appeared in someone else's collection. We hope so in order to get stock of it built up as fast as possible.

Foliage of the new flower was a little wider and a little bluer than that of *L. elsiae* and almost identical with that of the new creamy white described in PLANT LIFE, Vol. 17, No. 1, January, 1961 and poorly illustrated at pages 125-127; and again in this issue.

## FURTHER NOTES ON A CREAMY WHITE LYCORIS

William Lanier Hunt

In PLANT LIFE, Vol. 17, No. 1, Jan. 1961 at pp. 125-127, I wrote up a vigorous new creamy white *Lycoris* and published a poor illustration of it from a kodachrome. The plant which Mr. Caldwell describes in PLANT LIFE, Vol. 18, 1962 and illustrates at page 80 I believe to be the identical same plant.

In 1957, I sent a scape of this plant to Dr. Traub, and he made a botanical specimen of it and numbered the specimen #589 with the following description in his letter to me of Sept. 29th: ''Tepaltube 18—18.5 mm. long (Reportedly as Dresden yellow)''. I might add here that tepalsegs are 1 cm. wide.

My bulbs of this robust new *Lycoris* have increased both in pots and in the open. The foliage is of about the same degree of tenderness to cold as that of *L. elsiae.* Scapes are extremely robust. Frequently, they produce seven flowers to the scape, and the scapes are 19 inches and more tall.

Like Mr. Caldwell, I have tried pollen of everything I had in my garden or in the dessicator, in which I store and refrigerate pollen, on this new lycoris—all to no avail. This year, however, I do have seeds on the late fertile *L. radiata.* Will they be parthenocarpic?

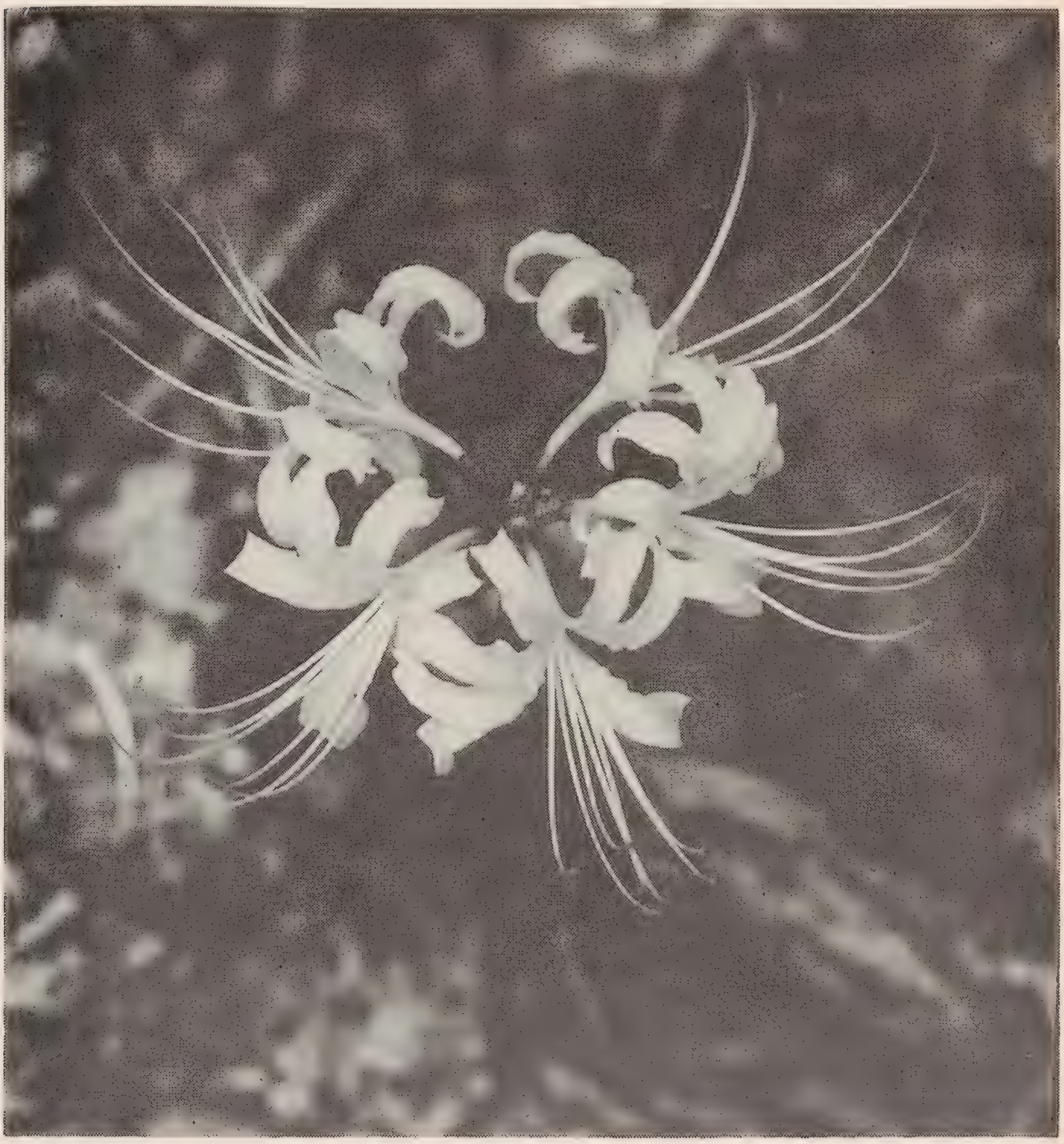

Fig. 10. A creamy-white *Lycoris* as flowered in the garden of William Lanier Hunt, Chapel Hill, North Carolina, in 1963.

# X CRINODONNA CL. 'DOCTOR STAFLEU'

Hamilton P. Traub, *California*

In 1961 an outstanding clone of X *Crinodonna traubii* Moldk., bloomed for the first time. Such hybrids are the result of crossing *Brunsvigia* x *parkeri* Wm. Wats. ex Traub, and *Crinum moorei* and are notable in showing quite a range of variation. In contrast X *Crinodonna corsii* Ragion. ex Traub which result from crossing *Brunsvigia major* Traub (1963) and *Crinum moorei,* give relatively uniform progeny.

The outstanding X *Crinodonna traubii* Moldk., clone was again observed in the 1962 and 1963 flowering seasons and in each case came up to expectations. It was thus considered as a candidate for naming. It has been named in honor of the lineagicist, Dr. F. A. Stafleu of the University of Utrecht, Netherlands.

### X **Crinodonna traubii** Moldk., cl. 'Doctor Stafleu' (Traub, 1964)

The vegetative characters are similar to those previously described by Traub (1961) for X *Crinodonna traubii* Moldk.

The umbel is many-flowered; the individual flowers are slightly declined, funnel-shaped, fairly wide open, somewhat star-shaped; the lower half of the tepaltube is yellowish-greenish, white above to half the length of the tepalsegs; the upper half of the tepalsegs delicately painted pink—between rhodamine pink (HCC-527/3) and Persian rose (HCC-527/3)—delightfully fragrant; pedicels at anthesis up to 2.6 cm. long; ovary oblong, flattish, 2 cm. long, 6x8 mm. in diam.; tepaltube curved, somewhat triangular, 3 cm. long, 5x6 mm. in diam. (base), 10 mm. diam. (apex); tepalsegs lanceolate, apex acute to bluntly acute; setsegs 9.2 cm. long, 3 cm. wide; petsegs 8.5 cm. long, 2.4 cm. wide; stamens 2/3 as long as the tepalsegs, upper 1/3 pinkish; style longer than the stamens, somewhat shorter than the tepalsegs, upper 1/3 pinkish, deeper toward stigma which is deep pink, capitate.

Holotype: Traub No. 955 (TRA), cult. La Jolla, Calif. 9-15-63.

## LITERATURE CITED

Traub, Hamilton P. The Genus X Crinodonna, 1921-1960—Catalog of X Crinodonna Cultivars. Plant Life 17: 65—74. 1961.

Traub, Hamilton P. *Brunsvigia major* Traub. Plant Life 19: 59. 1963.

# THE ENIGMA OF THE CULTIVATED CRINUM KIRKII

L. S. Hannibal, *Fair Oaks, California*

For some years the writer has grown *Crinum kirkii,* or what has long been called *C. kirkii* in the south, along with *C. sanderianum* which seems to be a smaller form of the above *C. kirkii.* At no time has the writer been able to obtain seeds or viable pollen from either plant. Similar experiences have been reported from Texas and Louisiana. Inquiry concerning *C. kirkii* discloses that it is common to the Rift

Valley in Kenya and grows well above 7000 ft. there. Also, that the plant rarely produces offsets and is best established by seed. This statement by Lady Jex-Blake is somewhat in contrast to our experience as the local form produces frequent offsets.

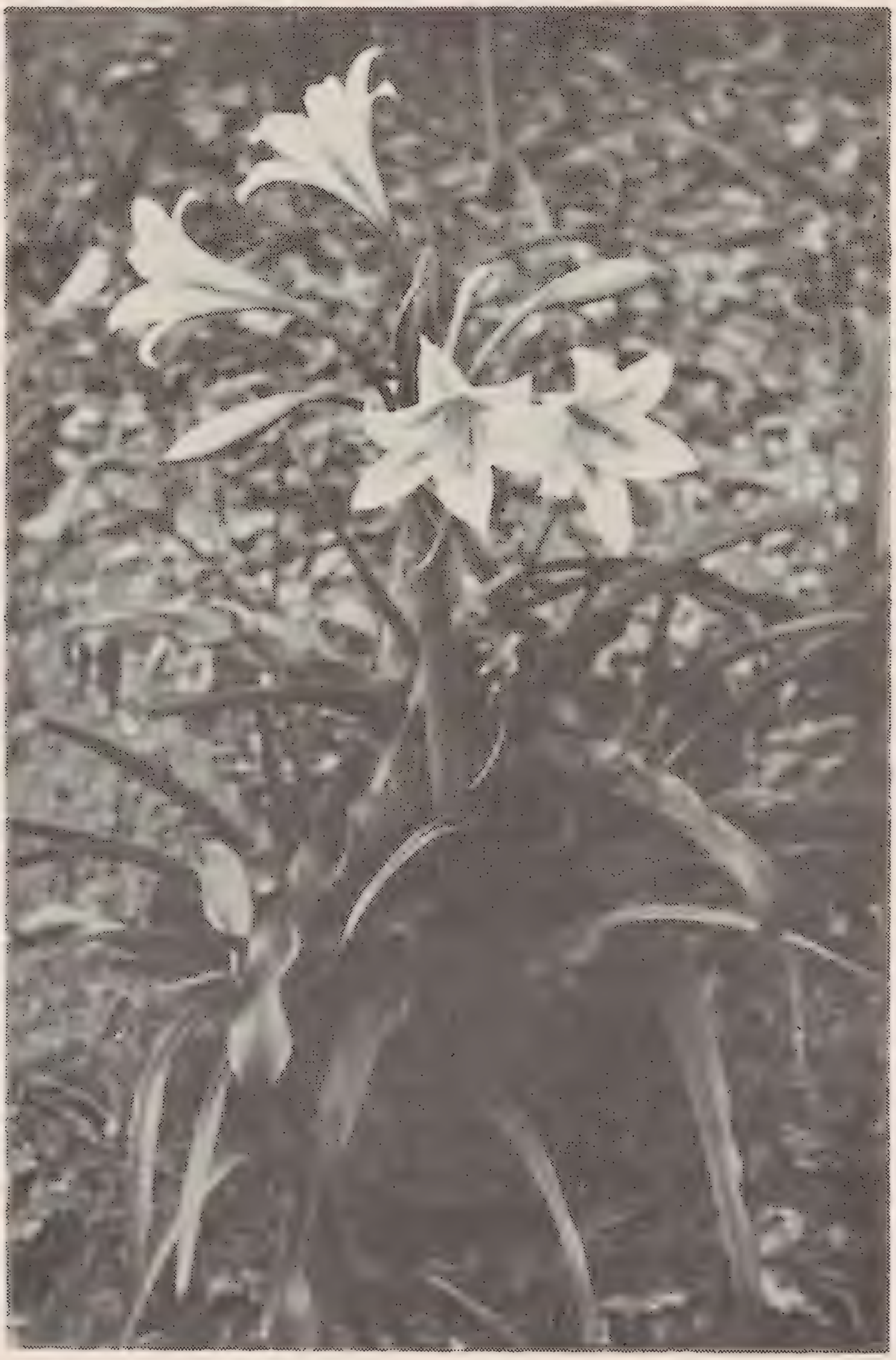

Fig. 11. *Crinum kirkii* as grown by William Morris in Australia. It is typical of high elevation species and grows best when nights are cool.

The matter recently came to a head when William Morris submitted several bulbs found in a garden near Sydney, Australia; which were presumably *C. kirkii*, but had much larger bulbs and broader, less erect foliage. On checking with Baker's original description and colour plate (Bot. Mag. pl. 6512) of *C. Kirkii* we find that this Australian bulb and its foliage to be in close agreement. The bulb is globose and the foliage which is 10 to 15 cm. broad spreads in a semi rosette from a very short neck. The adult leaves are relatively limp and droop upon the ground. They are not channeled.

In the light of this evidence it is possible that the so called *C. kirkii* in the United States are hybrids, and from the long slender channeled leaves we could suspect that *C. bulbispermum* is involved in the cross. Further investigation is necessary to confirm this, but in the verification of species there is no better proof than obtaining actual material from the wild. In this instance this should be done.

# CRINUM FLACCIDUM AND A YELLOW FORM

A. R. R. Higginson * *and* L. S. Hannibal

We have now grown and flowered several forms of *Crinum flaccidum* Herbert in the open for a sufficient length of time to be fairly familiar with most of the plant's distinct habits or features, several of which are well worth noting. The Darling River forms of north central New South Wales are probably better adapted to our Gulf states where summer rains occur, whereas the South Australian strains are ideally adapted to California's arid summer enviroment since the two climates are near identical. The superficial environment under glass or in Florida for a desert plant which normally experiences six inches of rain or less can cause a number of erroneous conclusions regarding these near unknown desert types. This is particularly true in reference to flowering, the Darling River and central desert forms flowers in late summer after the summer storms, but the South Australian form flowers in late autumn just preceding the winter rains. Most desert plants usually find it necessary to economize on foliage and we often find chlorophyll in petals and other floral parts. In *C. flaccidum* the flower buds are a vivid chlorophyll green until an hour or two before opening, then this green suddenly turns to a chartreuse, then amber, and finally to a white as the tepalsegs open up. In a greenhouse or on a warm evening the flowers usually open into a trumpet shape showing a curved tepaltube with declinate filaments, but when the temperature makes a decided drop of fifteen or twenty degrees as occurs in a desert at sundown the tepaltube becomes quite rigid and the tepalsegs assume on open patent position with spreading anthers.

Several other features are to be noted; in lieu of producing small offsets as occur with most Crinums, *C. flaccidum* splits rather suddenly into two plants in a manner similar to *C. asiaticum* or *C. pedunculatum*. Both the spreading of the anthers and splitting of the bulb are in my observation subgenus *Platyaster* features, however, a number of *C. flaccidum* forms have rather broad elliptical tepalsegs which appear contrary to the linear pattern prescribed for *Platyaster*. It is rather apparent that the identification key is in need of rectification.

The attractive yellow flowered form which comes from the rocky Pichi-Richi pass near Port Augusta in South Australia shows sufficient variation to be considered as a form. The color of the blossoms is rather an obvious feature. It is associated with the decomposition of the chlorophyll and may possibly occur due to the plant's adaptation to an alkaline soil of pH 8 or 9. The color is intermediate between a chartreuse green and dresden yellow (RHS 663/3 or/2 and 64/3 or/2). The color varies some from plant to plant, according to the age of the flowers, and according to the air temperatures. The deeper colors occur in cool weather. Secondly, the blossoms of the yellow form are about 60% the size of the type, have quite a pronounced elliptical tepalseg pattern, are prone to be quite patent with widely spreading anthers, and are inclined to develop quite a curvature to the tepaltube during the heat of the day. But the most distinctive of all features is the phototropic behavior of the scape and umbel which tends to face all of the blossoms into the sun and turn as does a sunflower. This particular behavior is not present in the other forms which tend to distribute the individual blossoms radially in the umbel and do not track the sun.

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* Deceased.

Other distinctions are that the filaments are yellow whereas those of the type are white, the style is amber whereas the type is purple in the upper portions, and only one or two blossoms open daily whereas the type opens two or three in a radial pattern. On the basis of the bulb and foliage there are no apparent distinctions, but the scape of the yellow form carries some rust-red pigmentation near the groundline whereas the other forms indicate only a slight trace of pigmentation. In most cases with other species the scape or bulb pigmentation is associated with plants having red or pink blossoms. However, there seem to be exceptions.

The Quirindi group of the Darling River *C. flaccidum,* which is the most easterly group thus far reported, is unique as far as variability of color and tepalseg shape are concerned. The colors range from white through pink to a wine red. This pigmentation is on the exterior of the tepalsegs. Tepalsegs may range from long slender ray-like to elliptical forms which are half as broad as they are long. We know of no other species with which this group of bulbs could have crossed naturally but if such a cross did take place in rather recent geological times then not enough time has elapsed for the genetic upset to become stabilized by natural selection. The diversity is rather fascinating. It is unfortunate that the imported plants do not tend to flower easily so we do not know if the group are entitled to the rank of form or not, but the plants do bear watching as the colored blossoms reportedly resemble magnolias.

## FURTHER NOTES ON AMERICAN CRINUMS

Mrs. Carl Shirley, *1540 Forsythe Street, Beaumont, Texas*

The notes will be arranged by collection dates. It appears that three different forms grow together since we have found them blooming at different times in the same places. There seems to be a slowing

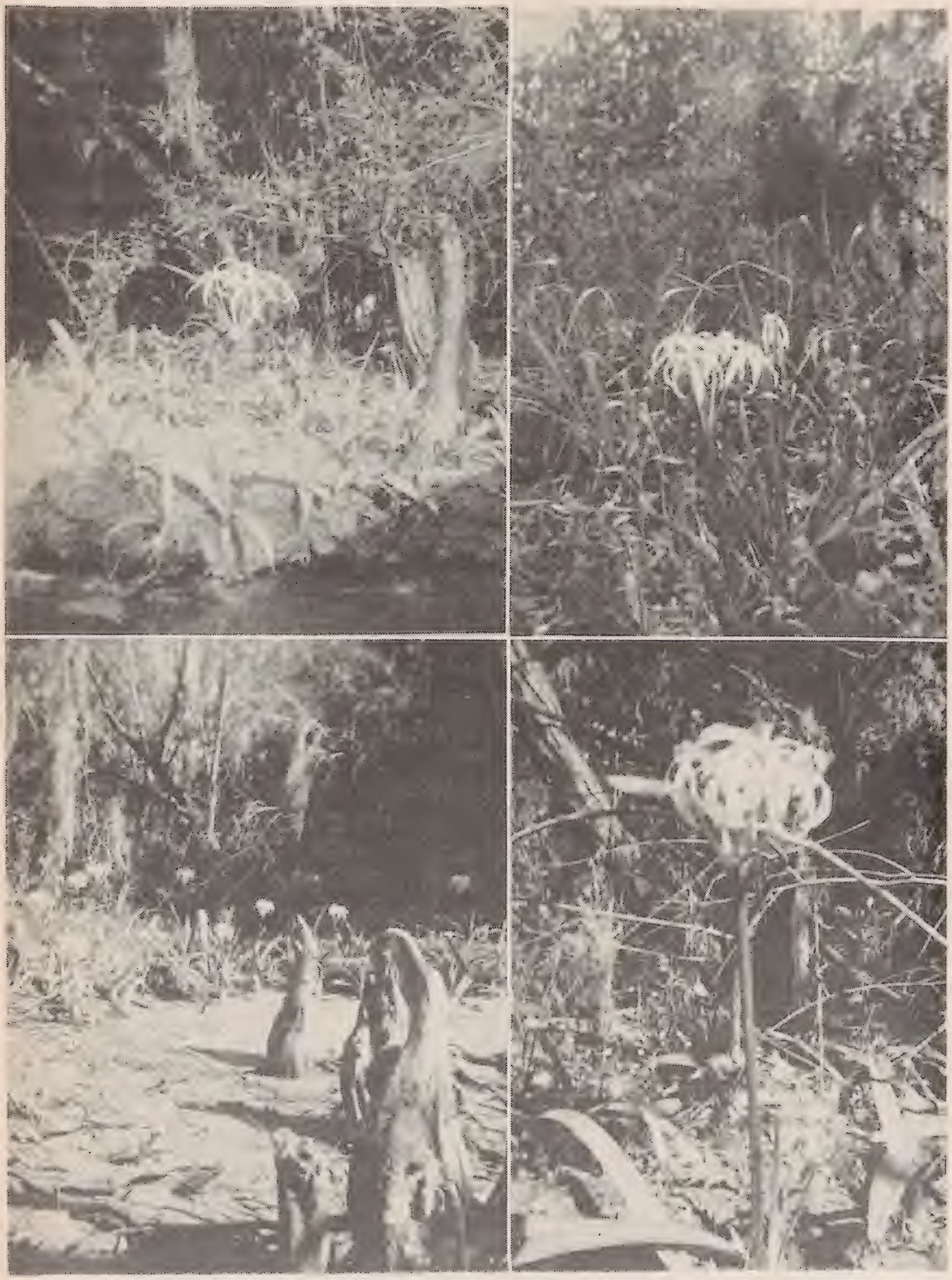

Fig. 12. Native American Crinums observed on the banks of the Neches River, Beaumont, Texas. Upper left, weak grower, apparently *Crinum americanum*, photo July 5, 1963; upper right, robust grower, apparently *Crinum strictum*, photo Sept. 14, 1963; lower left and right, robust growers, apparently *Crinum strictum* var. *traubii*, photo Nov. 11, 1962. All photos by Mrs. Carl Shirley.

The Cypress (*Taxodium distichum*) "knees" in lower left, protruding from the ground, function in conducting air to the roots of the tree.

up between the blooming of each of the forms and this may account for their apparently not intermixing.

We have had an exceptionally dry summer in 1963 except for the 20-inches of water in our yard during the downpours caused by hurricane "Cindy" in September. They have not bloomed well. I plan to pot some and keep the moisture up and note if this will help. I am hoping to have blooms on the "pink" ones this year, and we are looking forward to our trip in November to see if we are able to find more of these plants.

July 5, 1963.—Collections were made in Jefferson County, about 2 miles south of State Highway 90 bridge across the Neches River, in a little bayou. These are some of the very small-type (see Fig. 12). Evidently they bloom at different times here too.

July 27, 1963.—There were not many blooms in evidence on this trip. It appears that *Crinum americanum* finishes its blooming season around the end of July. We originally believed that their blooming season began in July, but have since found some in bloom in mid-June. Thus the flowering season may start earlier.

August 17, 1963.—We found very, very few blooms on this trip. Seeds were mature from earlier blooms, and we collected some. They were large seed-pods with the antenna-like projection on top.

September 14, 1963.—We collected a few bulbs in bloom on this trip (see Fig. 12). These apparently are *Crinum strictum.*

October 26, 1963.—We collected some bulbs in bloom, but they were few and far between. We collected many seeds that apparently are *Crinum strictum* that bloomed in September.

November 11, 1962.—We found many blooms. This was the first time we were able to reach these. The water was at a very low level at that time of year, and had not been before, and has not since, in our memory, been that low. We were able to get some close-ups (see Fig. 12). Some of these were of the "pink-hued" kind. These very late flowering plants apparently are *Crinum strictum* var. *traubii* Moldk.

All of these different kinds—*Crinum americanum, C. strictum,* and *C. strictum* var. *traubii*—appear to grow together and bloom at different times. There is apparently a slowing-up of bloom between the flowering periods and this accounts for little if any interbreeding.

## DECREASE IN SIZE OF HERBARIUM SPECIMENS DUE TO DRYING

HAMILTON P. TRAUB

In connection with the drying of *Hymenocallis kimballiae* leaf specimens on January 20, 1962, preliminary data on the decrease in width and length of leaf measurements were obtained. Duplicate leaf specimens of *Hymenocallis kimballiae* were dried between blotters separated by corrugated aluminum separators in the plant press with heat supplied from an air circulation furnace outlet. The measurements before and after drying are shown in Table 1.

Table 1. Decrease in size of herbarium specimens (leaves) of **Hymenocallis kimballiae** Small ex Traub due to drying.

| | At start cm. | After drying cm. | Extent of decrease cm. | Percent of decrease |
|---|---|---|---|---|
| Width | 8.6 | 7.7* | 1.1 | 12.3 |
| | 10.4 | 9.1* | 1.3 | 12.6 |
| Length | 82.5 | 79.2 | 3.3 | 3.0 |
| | 82.0 | 80.9 | 1.1 | 1.3 |

* It should be indicated that the extent of shrinkage at cross-sections was less than indicated.

The important conclusion from Table 1 is that the loss for percentage width is relatively much greater than for percentage length.

These results are to be considered as a preliminary sampling, and should be followed up with a larger number of measurements under specified drying conditions so that there could be available data that might be useful as the basis of allowances to be made when describing dried specimens.

# HOW I PREPARE PLANT SPECIMENS FOR IDENTIFICATION

Alek Korsakoff, *2975 Shipping Ave., Miami, Florida, 33133*

In preparing plant specimens to be sent in for identification, I prefer to use paper toweling (2 attached sheets). At the beginning I tried the plants with the flowers unopened, but found that it was difficult to make the identification on that basis. Therefore, I am now opening the amaryllid flower to show the relationship of the parts—tepaltube, tepals, stamens and pistil—so that the person who is to make the identification may have a better chance to make it. So, I cut the tepaltube, if there is any, on through the ovary and part of the pedicel—about half way. The flower is then spread out with the inside showing which exposes all of the parts for ready observation. If a second flower is available, one of these is placed so as to show the way it actually appears in bloom.

To hold the plant and flower in place, I use tiny strips of masking tape or similar tape, for holding down the unruly parts. I believe that it is best to tape every part which is mounted—roots, leaves, scape, and flower parts, before pressing.

If there is no facility for quick drying, the following procedure is followed: The specimen on the towel paper is covered with another layer of towel paper, a few layers of newspaper are placed below and above mounted specimen to be dried, and the whole is placed under a stack of heavy books. This works well for *Zephyranthes* and similar small amaryllids.

If the specimen is a large *Amaryllis* for instance, then the large parts such as the scape and the ovary, are split lengthwise and one half is discarded. This will aid in drying.

When sending in the specimen, if the plant is not too large and thick, it is even possible to fold the towel paper with mounted specimen for insertion into an envelope, but better results are obtained by using two thicknesses of cardboard without folding.

## REGISTRATION OF NEW AMARYLLID CLONES

*Mr. W. D. Morton, Jr., Registrar,*
*Mr. Edward Authement, and Mrs. Emma D. Menninger,*
*Assistant Registrars*

This department has been included since 1934 to provide a place for the registration of names of cultivated *Amaryllis* and other amaryllids on an International basis. The procedure is in harmony with the INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE (edition publ. 1961) and the INTERNATIONAL CODE OF NOMENCLATURE FOR CULTIVATED PLANTS (edition publ. 1958). Catalogs of registered names, as well as unregistered validly published names, will be published from time to time as the need arises. The first one, "DESCRIPTIVE CATALOG OF HEMOROCALLIS CLONES, 1893-1948" by Norton, Stuntz and Ballard was published in 1949. This may be obtained at $2.50 prepaid from: Dr. Thos. W. Whitaker, Executive Secy., THE AMERICAN PLANT LIFE SOCIETY, Box 150, La Jolla, Calif. CATALOG OF HYBRID NERINE CLONES, 1882-1958, by Emma D. Menninger; and CATALOG OF BRUNSVIGIA CULTIVARIS, 1837-1959, by Hamilton P. Traub and L. S. Hannibal, were published in 1960 Plant Life, with additions to both in Plant Life 1961. In Plant Life 1961, the first edition of THE GENUS X CRINODONNA was published which serves also as a catalog of cultivars. A catalog of Amaryllis names and also catalogs of the names of other cultivated amaryllids, are scheduled for publication in future issues.

Only registered named clones of Amaryllis and other amaryllids are eligible for awards and honors of the AMERICAN AMARYLLIS SOCIETY at Official Amaryllis Shows.

Correspondence regarding registration of all amaryllids such as *Amaryllis, Lycoris, Brunsvigia, Clivia, Crinum, Hymenocallis,* and so on should be addressed to Mr. W. D. Morton, Jr., Registrar, 3114 State Street Drive, New Orleans 25, Louisiana. The registration fee is $2.00 for each clone to be registered. Make checks payable to AMERICAN PLANT LIFE SOCIETY.

### THE TERM "STRAIN" DROPPED

In "The International Code of Nomenclature for Cultivated Plants," edition 1961, adopted by The International Commission for the Nomenclature of Cultivated Plants, Article 12, it is stated that the "practice of designating an improved selection of a cultivar (variety) as a strain or equivalent term is not adopted in this Code." In harmony with this provision, the American Amaryllis Society, affiliated with The American Plant Life Society, will discontinue using this term in all official publications.

Under Article 12, it is indicated that any such selection showing sufficient difference from the parent cultivar (variety) to render it worthy of a name is to be regarded as a distinct cultivar (variety). Thus, *Amaryllis* clones when named should be referred to the proper Division, and should no longer be indicated as belonging to the "Mead Strain," or any other "strain." The breeder's name should be indicated in the registration procedure.

Cultivated *Amaryllis* hybrids are divided into eight main Divisions, and one Division to take care of any that do not fall within any of the seven, as explained in Traub—The *Amaryllis Manual.* 1958.—

Cultivated wild Amaryllis, or Division 1 (D-1)
*Amaryllis* 'Elegans Hybrids,' or Division 2 (D-2)
  *Amaryllis* 'Belladonna Hybrids,' or Division 3 (D-3)
  *Amaryllis* 'Reginae Hybrids' or Division 4 (D-4); subdivision D-4A and D-4B
*Amaryllis* 'Leopoldii Hybrids,' or Division 5 (D-5); subdivisions D-5A and D-5B
*Amaryllis* 'Orchid-Flowering Hybrids,' or Division 6 (D-6)
*Amaryllis* 'Double Hybrids,' or Division 7 (D-7)
*Amaryllis* 'Miniature Hybrids,' or Division 8 (D-8)
  *Amaryllis* 'Unclassified Hybrids,' or Division 9 (D-9).

## ZEPHYRANTHES X RUTHIAE CLONE 'ELLEN KORSAKOFF'

Hamilton P. Traub, *California*

Under date of July 23, 1963, Mr. Alek Korsakoff, 2975 Shipping Ave., Miami, Florida, sent a dried specimen of a *Zephyranthes* hybrid he had duplicated. A similar cross had been made by Dr. Howard of San Antonio, Texas: *Z. rosea* x *Z. citrina,* and it was named *Zephyranthes* x *ruthiae.* Mr. Korsakoff repeated the cross Oct. 1, 1960, and first blooms were obtained June 21, 1962; only one seedling survived. However, this is a particularly beautiful hybrid and the clone has been named for the late wife of Mr. Korsakoff:

*Zephyranthes* x *ruthiae* cl., *'Ellen Korsakoff'*

Bulb globose up to 1 inch in diam., brown to black, with neck about ½ inch in diam.; offsets produced freely; prefers full sun; leaves 10—13″ long, about ¼ inch wide, shape and color of *Zephyranthes rosea;* flowers buttercup yellow, (HCC-5/2), shaded on edges and tips with mandarin red (HCC-17/2) with center of Cyprus green (HCC-59); open to 2⅞ inches wide; tepaltube about ¼ inch long; tepalsegs 1¾ inches long, setsegs, ½ inch wide; petsegs ⅝ inch wide; pedicel about 2 inches long; peduncle 9 inches long, round.

Holotype: No. 954 (TRA), cult. Alek Korsakoff, Miami, Florida, 7-23-63.

# GROWING WORSLEYA RAYNERI FROM SEEDS

(In 1962, Mr. Robert D. Goedert, of Jacksonville, Florida, paid a collector to gather seeds of *Worsleya rayneri* from a mountain top in Brasil. These seeds were made available to his customers. It will be most interesting and helpful to record the successes and failures of those who experimented with these rare and valuable seeds. Two reports are included in the present issue. It is hoped that others will send in reports of their experiments for publication here without any special request from the editor.—*Editor*).

## 1. REPORT FROM SAN DIEGO, CALIF., by Burr Clouette

The seeds of *Worsleya rayneri* was very difficult for me to germinate. I had to obtain two batches of seeds, about 60 in all, to obtain only two plants, after losses suffered. Only one of these is thriving, and the other has lost its roots and leaves although the bulb seems to be sound.

I tried three different ways for the germination of the seeds: (a) planted in Black Magic planter mix—some germination, but all seedlings damped off; (b) floating seeds on mineral water (the kind for human consumption)—no germination; and (c) planted in vermiculite—about a fourth of the seeds germinated, 5 seedlings in all—only two seedlings have survived.

The sound seedling mentioned above is doing well and seems to be able to make a go of it. It is now almost a year old. The neck is a couple of inches long, and about as big around as a lead pencil. The bulb is about a half inch in diameter (see Fig. 22).

This seedling is planted in a square 2-inch plastic pot in Black Magic planter mix. I fertilize it and all of my other *Amaryllis* every two weeks with a half strength liquid fertilizer. Occasionally instead of a complete fertilizer, I use one of the so-called acid fertilizers which is low in nitrogen and high in phosphorus.

## 2. REPORT FROM LA JOLLA, CALIF., by Hamilton P. Traub

In 1940-1942, the writer obtained a few seeds of *Worsleya rayneri* from Rex Pearce Seed Company. These were germinated at Beltsville, Maryland. The writer noticed what appeared to be mycorrhiza on the roots of the seedlings, but before he could finish the research into this the war intervened. When he returned to Beltsville, Maryland, in 1945, the seedlings had died from neglect.

In 1962, he received seeds of *Worsleya rayneri* from Mr. Robert D. Goedert of Jacksonville, Florida. These were floated on tap water and every seed germinated. Mr. Clouette who tried mineral water had no success and this may be due to the mineral water that he used.

The seedlings are being grown in two potting mixtures: (a) equal parts of garden loam and granulated peat; and (b) Black Magic planter mix, and also a similar mix made by the writer. They are growing very slowly in both mixtures, but seem to be a little larger in the second. The seedlings are not higher than 2 to 2½ inches. Lately a slowly available fertilizer has been used and this appears to be effective. In the second report, the writer hopes to record better success with this most difficult species.

## CHROMOSOMES OF HEMEROCALLIS 'GEORGE GILMER'

WALTER S. FLORY, *Wake Forest College, Winston-Salem, North Carolina*

In the 1959 PLANT LIFE (15:28-29) Dr. H. P. Traub described a new yellow-flowered daylily under the title "The 'George Gilmer' Diploid Daylily."

Since that time the vigor of this clone—coupled with its lush growth, profusion of flowers, and other meritorious characteristics—has led to the suspicion that 'George Gilmer' might actually be a polyploid, perhaps a tetraploid, type. In the spring of 1963 Dr. Traub had a division of this variety sent to us and at his request we have examined the chromosomes of this plant.

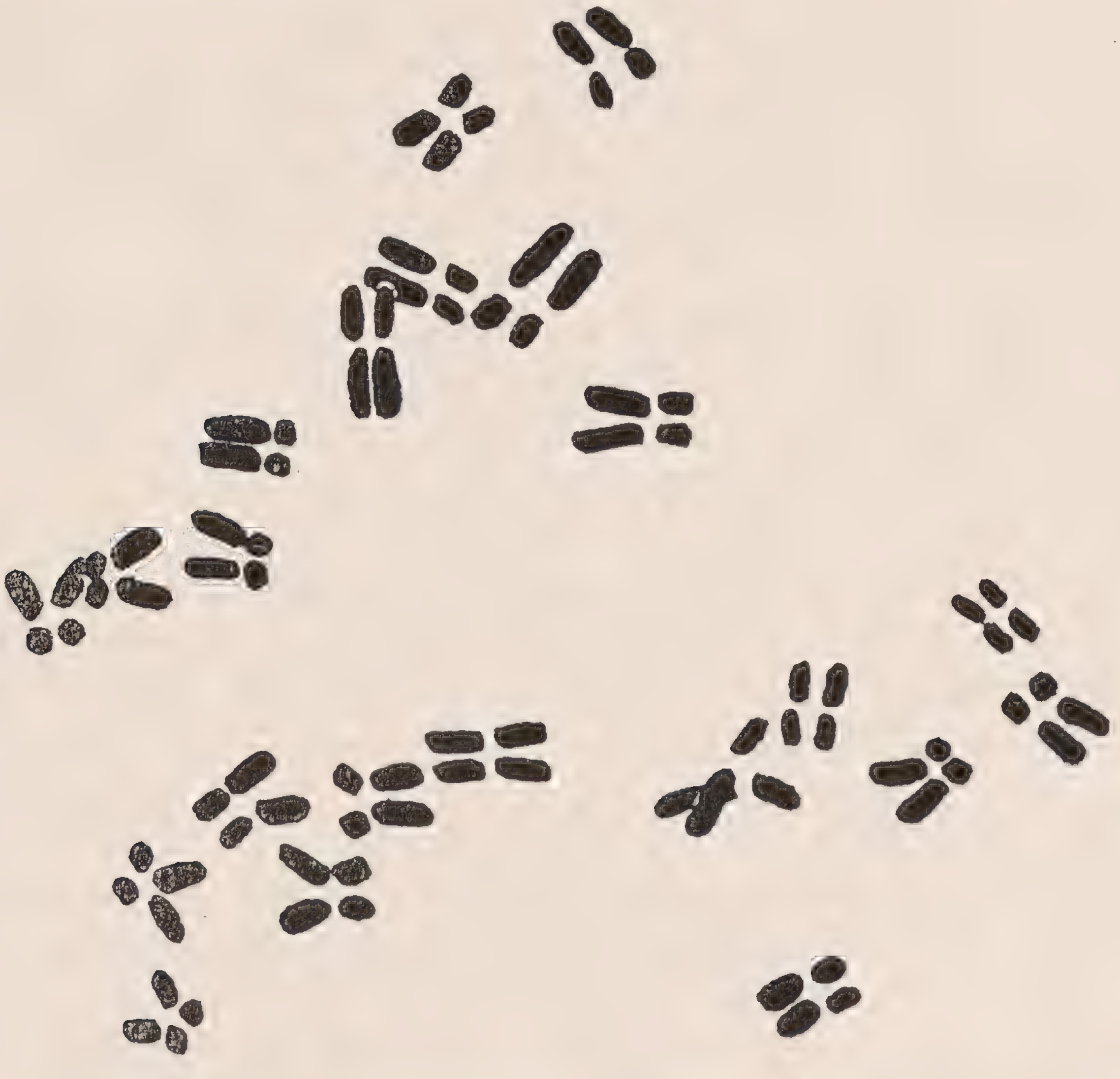

Fig. 13. Somatic chromosomes from a root-tip of *Hemerocallis* clone 'George Gilmer'. 2n = 22. X 1500.

The 'George Gilmer' variety has 22 chromosomes and hence is a diploid as suggested in its original description. Thus while the variety does possess certain characters most usually found in tetraploid daylilies, these must here be attributed to either, or both, the type or the arrangement of genes present.

The accompanying figure (Fig. 13) depicts the somatic chromosomes at metaphase, as drawn by camera-lucida from a rather typical root-tip nuclear division. This root-tip had been treated for 4 hours in a 0.2% colchicine solution, fixed in acetic-alcohol (3:1) overnight and squashed in 1% acetic-orcein. The chromosome pretreatment was sufficient to permit the two chromatids of each individual chromosome to separate slightly. The chromosomes range in length from about 3.3 to 6.7 microns, with the majority being from 4 to 5 microns long and having subterminal centromeres. At least one of the longest, and one of the shortest, chromosome pairs have median, or near median, centromeres.

# AMARYLLID NOTES, 1964

HAMILTON P. TRAUB

*Hymenocallis lobata* Klotzsch, in Otto & Dietr., Allg. Gartenz. 11: 124. 1843, *nomen nudum.* This is indicated as a new species introduced by Ed. Otto from Caracas, Venezuela, which had not flowered in culture up to 1843. Thus, it was never described.

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*Nothoscordum inodorum* (Ait.) Nichols (syn.—*N. fragrans* (Vent.) Kunth) has recently been collected for Robert D. Goedert, of Jacksonville, Fla., by his collector in Santa Caterina, Brasil. Local name ''Acucena''; flowering range, March-January; alt. 63 m.; average range 20°—35° C. Growing in half shade, near the river.

This plant has proved to be a weed in California, but apparently is not so noxious in the humid East and Southeast. The flowers are small, whitish tinged light pinkish; delightfully fragrant.

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### ''Gardinia Bertero'', **nom. nudum**

### ''G. purpurascens Bertero'', **nom. subnudum**

In 1929, Bertero published a ''List of plants observed in Chile'' in ''Mercurio Chileno'', nos. 12, 13 & 14, Mar., Apr., and May, 1829. In this there appeared a brief reference to ''Gardinia purpurascens Bertero'', ''A bulbous plant resembling the *Allium* and the *Ornithogalum,* L., which I have seen only once in the inclosures along the road leading to Quinta, not far from the houses of Zamorano. It is called ''mapolita azul'', and merits cultivation in gardens on account of the elegant color of its flowers''.

An article based on the above was published as ''Liste des plantes observées au Chili, dans l'année 1828, par le Dr. Bertero (Mercurio Chileno, no. 12, 13 et 14, mars avril et mai 1829)'' in ''Bulletin des sciences naturelles et de géologié, rédigé par MM. Delafosse, Guillemin, et Kuhn. 2nd Section du Bulletin Universel, publié sous les auspices de Monseigneur le Dauphin, par la Société pour la propagation des connaissances scientifiques et industrielles, et sous la direction de M. le Baron de Férussac''. v. 20. pp. 105—112. 1930. On page 112, there is a reference to 'Gardinia purpurascens, Bertero. Cette plante est le type d'un nouveau genre, que l'auteur place entre L'Allium et L'Ornithogalum''.

This article was also translated into English by W. S. W. Ruschenberger, M. D., U. S. Navy, and sent to the editor of ''The American Journal of Sciences and Arts'', and was published in that publication in vol. 19 : 63—70 ; vol. 20 : 248-260 ; vol. 23 : 78—96, 250—271. 1931—33. On page 81, appears the brief reference to ''Gardinia purpurascens Bertero''.

Although the generic name ''Gardinia Bertero'' was never published, it is listed in Index Kewensis, along with the species name, ''Gardinia purpurascens Bertero''. In Steud., Nom. ed. II. i. 667, it is listed as ''Gardinia violacea Bert. ex Steud.''

It is thus clear that the generic name ''Gardinia Bertero'' was never published and is thus a *nomen nudum*. ''Gardinia purpurascens Bertero'' is not validly published since it is not possible to identify it from the general reference. The new name for it by Steudel, without a description is also a *nomen subnudum*.

## THE NAMING OF CRINUM GIGANTEUM

The amateur grower is usually confused about the application of the epithet 'giganteum' as applied to a certain average-sized *Crinum*. He believes that such a name has to refer to a 'very large' plant. However, according to the Code, no matter how inapt the name first given to a plant, it has to be used forever thereafter. Thus, the confusion about the name, *Crinum giganteum* which represents an average-sized plant. When confronted with a very large to them unknown *Crinum* species, some readers assumed that it was *Crinum giganteum* and wasted much time and effort trying to prove it. To settle this matter, the following quotation from Richard Anthony Salisbury (1761-1829)—The Genera of Plants; a fragment containing the Part of Liriogamae. 1866 —is reproduced:

''. . . *Crinum giganteum* of Botanist's Repository was ridiculously so called, owing to the blunder of a Scotch Gardener, as it is by no means a very large plant; but a little before it was first figured by Thompson in 1798, I had proposed the name of *Gigas* for a true *Crinum* in the *Marchioness* of Rockingham's collection, just sent to her from Port Jackson, the *Pedunculatum* of Mr. R. Brown, which is really gigantic in size; and this Scotch gardener happening to be present in the stove at its christening, when he returned to Lee and Kennedy's, mistook one of the Sierra Leone plants given to them by the Marchioness, for a young sucker of that from Port Jackson, and told them it was so called, transforming by his Northern pronunciation *Gigas* into *Jagus*, in which latter way the name is printed in the work above mentioned; afterwards when the figure of the Botanist's Repository came out, Mr. Kennedy changed *Jagus* to *giganteum*. . . .''

Since 'jagus' is really a misspelling of 'gigas' and can be corrected according to the Code, the corrected first name of *Crinum giganteum* Andr. Bot. Rep. pl. 169. (1798) is really *Amaryllis gigas* Thompson, Bot. Displ. pl. 6. 1798, err. *Jagus*. But *Crinum gigas* Nakai (1930), the giant *Crinum* on the Island of Iwo Jima, is a different plant—a form either of *Crinum asiaticum* or *C. pedunculatum.* Thus, *Crinum giganteum* Andr. (1789) has to stand, and *Crinum gigas* (Thompson) Dandy, in Jour. Bot. Lond. lxxvii. 64. 1939, err. *Jagus,* is a synonym.

## COLOR FORMS OF CRINUM GOUWSII

In the 1950's, the writer obtained seeds of *Crinum gouwsii* Traub by crossing siblings because no seeds could be set by self-pollination. These seeds were distributed as widely as possible. A few were sprouted here. Three were set in a location where they would not be over-watered, and one seedling had been blooming since 1960. However, no seeds could be set by self-pollination. In June 1962, two seedlings bloomed at the same time, and it was possible to set seeds by crossing the two siblings. It was noted that the flowers of one of the seedlings were streaked a deeper purplish in contrast to the color noted in the original description (see Plant Life 38: 38—41, plate 8. 1954). Thus the seeds distributed should carry the genes for this deeper colored form and it should be possible to establish it as a true breeding form by inbreeding. This is a challenge to those who received seeds from this season's crop.

## FRUITS AND SEEDS OF **CRINUM BULBISPERMUM**

The various varieties of *Crinum bulbispermum* differ in the capacity to produce seeds. The variety *roseum* does not flower as freely as variety *album* and thus the latter produces many more seeds.

Table 1. The fruits and seeds of **Crinum bulbispermum** var. **album,** from open pollination, 1962.

| | Fruits | | |
|---|---|---|---|
| shape | length cm. | diam. cm. | Number of seeds * |
| round | 2.5 | 2.5 | 1 |
| triangular, rounded edges | 3.3 | 5.1 | 3 |
| | 3.5 | 3.5 | 5 |
| irregular (lumpy) | 4.8 | 5.2 | 8 |
| | 4.4 | 6.5 | 9 |
| globular | 6.5 | 7.0 | 42 |

* Seeds are round or roundish if solitary in the fruit; irregular, angled from pressure when several are in the fruit. Length and diameter of seeds:—

| length cm. | diam. | length cm. | diam. |
|---|---|---|---|
| 1.5 | 1.1 | 2.3 | 3.0 |
| 2.3 | 2.2 | 3.1 | 3.5 |
| 2.5 | 2.0 | 2.4 | 3.7 |
| 2.5 | 2.8 | | |

The variety *album* has a yellowish-green tepaltube, and the white tepalsegs are banded inside and outside with yellowish-green. The fruits are yellowish-green, stained amber where exposed to the sun. The fruits of variety *roseum* are light green, stained brownish-reddish where exposed to the sun.

The variety *album* produces so many seeds by *open pollination* that it is a real task to transport them to the trash can. If left on the ground, hundreds of seedlings will soon spring up. In June 1962, the writer again noted some of the huge globular fruits up to 7 cm. in diameter along with the smaller fruits. The data is summarized in Table 1.

## ANTHER COLOR AS DIAGNOSTIC FACTOR IN BRUNSVIGIA HYBRIDS

When deanthering large numbers of the flowers of *Brunsvigia* major, and various *Brunsvigia* x *parkeri* clones in a breeding project, it was noted that the anther color differed markedly before dehisence: *B. major* (dull whitish anthers); B. x parkeri, (English group) received as "*B.* x *kewensis*" (light lavender anthers); *B.* x *parkeri* (Zwanenburg group) clone 'Johannesburg' (faintly lavender anthers); *B.* x parkeri (Australian group) clone 'Hathor' (white anthers); and *B.* x parkeri (American group) Hannibal clone (anthers reddish).

It is thus important to compare anther color in the hybrids with that of the reported parents—*Brunsvigia rosea, B. josephinae, B. arientalis, B. grandiflora* and other *Brunsvigia* species. Thus something could be learned about the parentage of the hybrids since the various characters tend to segregate in the progeny after the first generation.

### **Lycoris x jacksoniana** Traub, **hybr. nov.**

Plantae hybridae reciprocae inter L. sprengeri et L. radiatam; foliis L. radiata fusco-viridioribus; scapo usque ad 55 cm. alto; spatha anguste lanceolata 3.5—4 cm. longa; umbella 5—6-8-flora; floribus L. radiata minus subpurpureo-rubellis usque ad magis subpurpureo-rubris; pedicellis 1.7—4 cm. longis; ovario 5 mm. longo; tubo tepalorum 8—10 mm. longo; segmentis tepalorum 4.7—4.8 cm. longis 0.9—1.3 cm. latis.

Originated by Sam Caldwell of Nashville, Tenn.

Holotype: No. 960 (TRA), collected by Sam Caldwell, Aug. 16, 1963. Paratypes: Nos. 958, 959 (TRA).

(CONTINUED from page 5.)

THE FLOWER ARRANGEMENT CALENDAR, 1964, by Helen Van Pelt Wilson. M. Barrows Co., 425 Park Av., So., New York 16, N. Y. 1963. $1.50. The publishers sponsor an annual flower arrangement calendar contest. In this little book, some of the outstanding photographs of floral arrangements accepted by the publishers are reproduced in calendar form for 1964. This calendar will appeal to those interested in flower arranging.

JUNIOR FLOWER SHOWS, by Katherine N. Cutler. M. Barrows & Co., 425 Park Av., So., New York 16, N. Y. Pp. 145. Illus. $3.50. This is a guide calculated to help stage flower shows in which children from the elementary grades on through high school may participate. It will appeal to parents, teachers, garden-club members, and scout leaders, and also to the children themselves.

THE NEW COMPLETE BOOK OF AFRICAN VIOLETS, by Helen Van Pelt Wilson. M. Barrows & Co., 425 Park Av., So., New York 16, N. Y. Pp. 299. Illus. $5.95. This is a revised and enlarged edition of the author's earlier book on the same subject, incorporating new material on genetics, club programs, selling, photographing, and a chapter on other gesneriads. Profusely illustrated.

THE MICROBIAL WORLD, by R. Y. Stanier, M. Doudoroff, and E. A. Adelberg. 2d ed., Prentice-Hall, Englewood Cliffs, N. J. 1963. Pp. 753. Illus. This revised, up-dated edition of this highly valued standard text on microbiology will be welcomed by students and teachers. A new feature of this edition is the introduction of biological principles at appropriate points in the text which allows for a more coherent and unified development of fundamental topics such as cell structure, metabolism and nutrition. The introductory portion is followed by a survey of the principal microbial groups; an exposition of microbial nutrition, metabolism and physiology; an account of bacterial cytology, genetics and classification; and discussions of the role of microorganisms in the cycles of matter, their mutualistic and parasitic relationship with other forms of life, and their utilization by man; recent discoveries about the fundamental structure of cells, and the nature of viruses; and recent developments in molecular genetics. This is required reading for all who are interested in microorganisms; and this outstanding text is highly recommended.

BIOCHEMICAL SYSTEMATICS, by R. E. Alston and B. L. Turner. Prentice-Hall, Englewood Cliffs, N. J. 1963. Pp. 404. Illus. This outstanding new text will be welcomed especially by all who are interested in biosystematics. The authors have brought together for the first time a summary of the biochemical data which has bearing on the grouping of organisms into lineages, and they are to be congratulated on an excellent job. Following the introduction, there are chapters on taxonomic principles; plant taxonomy; introduction to biochemical systematics; serology and systematics; amino acids; fatty acids; carbohydrates; alkaloids; cyanogenetic substances; phenolic substances; quinones; terpenoids; misc. compounds; biochemical studies of hybrids; and general evaluation. This original contribution is required reading for biochemists and biosystematists. Highly recommended.

ADVANCES IN AGRONOMY, Vol. 15, edited by A. G. Norman. Academic Press, 111 5th Av., New York 3, N. Y. 1963. Pp. 415. Illus. $13.50. This 15th volume in the series includes contributions from fourteen outstanding authorities. The topics covered are competition among crop and pasture plants; chemistry of the micronutrient elements in soil; impact of chemical weed control on farm management practices; the physics of wind erosion and its control; plant nutrient losses from soils by water erosion; creeping alfalfas; and silica in soils. Highly recommended.

MICROBIAL CLASSIFICATION, edited by G. C. Ainsworth and P. H. A. Sneath. Cambridge Univ. Press, 32 E. 57th St., New York 22, N. Y. 1962. Pp. 483. Illus. $9.50. The papers included in this book were delivered at the 1962 London microbiological symposium in which twenty-three authorites participated. The papers are concerned with current approaches to the classification of microorganisms—protozoa, algae, fungi, bacteria and viruses. Morphological biochemical and genetical approaches are evaluated against a theoretical background; and the procedures in classification, nomenclature and identification are discussed. This stimulating book should serve as an introductory text in the field of microbial classification, and is highly recommended.

THE ARCHITECTURE OF MATTER, by Stephen Toulmin and June Goodfield. Harper & Row, 49 E. 33rd St., New York 16, N. Y. 1962. Pp. 399. Illus. $7.50. This outstanding new book on the philosophy of science will be welcomed by all scientists. In Part 1, the authors trace problems concerned with matter from ancient to early modern times. In Part 2, the activities of the inanimate are explored beginning with Boyle and Newton, and on through to quantum theory. In Part 3, the structure of living things is examined. In an epilogue, the possibilities of a reunified view of matter and life is considered. Apparently the chemical elements, as such, are neither inorganic or organic but they may potentially function in either the one or the other role. This stimulating book is required reading for all scientists.

(CONTINUED on page 116.)

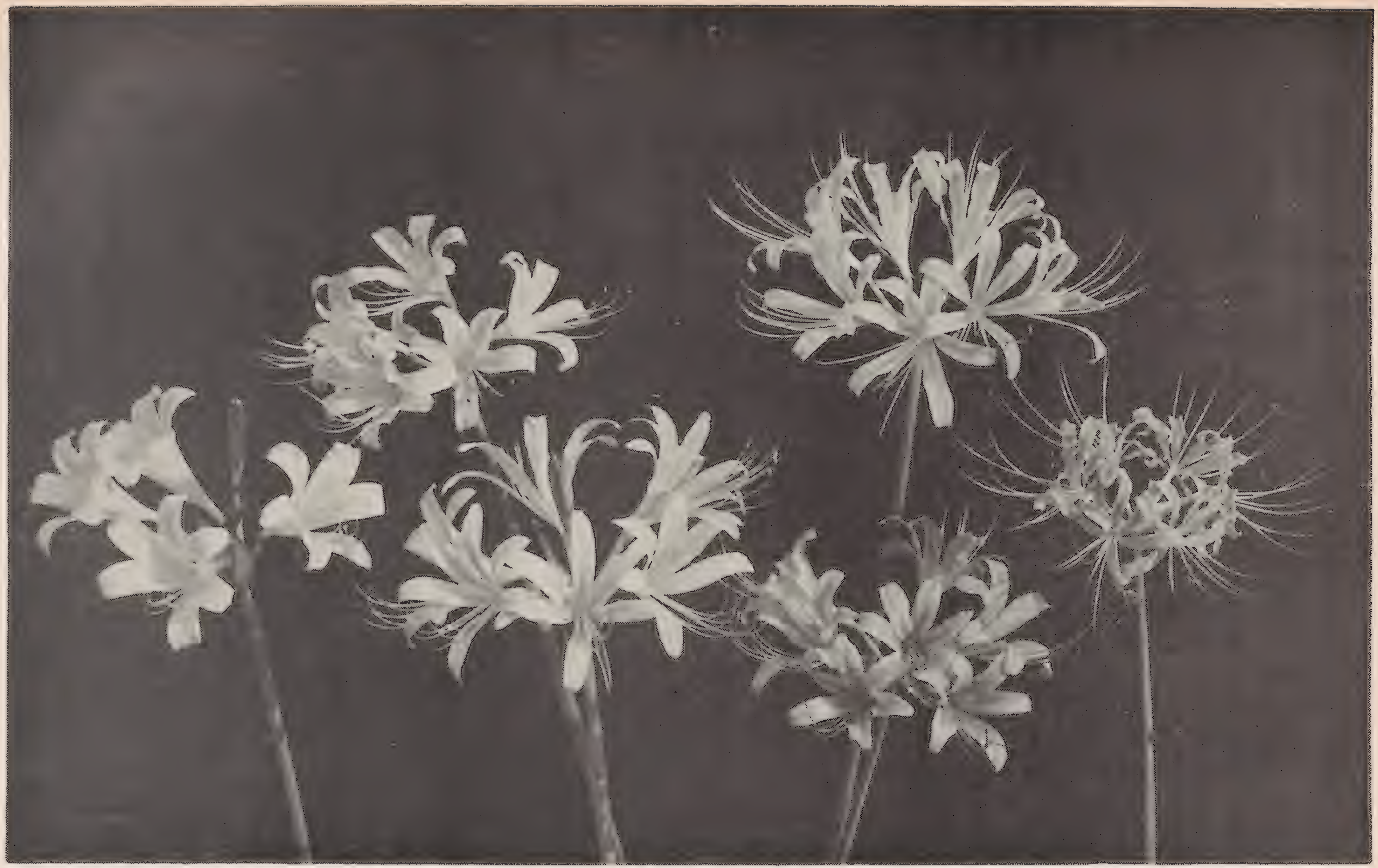

Fig. 14. **Lycoris** species and hybrids between them. Extreme left, **L. sprengeri,** and extreme right, **L. radiata;** flowering scapes of four hybrid seedlings between these two parents are grouped in the center. The new hybrid has been named **Lycoris x jacksoniana,** in honor of President Andrew Jackson whose home, The Heritage, is near Nashville, Tennessee. Photo by Sam Caldwell

# 3. GENETICS AND BREEDING

## LYCORIS REPORT—1963

Sam Caldwell, *Tennessee*

The good old summertime in middle Tennessee, where I live, is not always good from the gardener's viewpoint. It can be beautiful when the rains come occasionally, but too many summers are hot and dry, and gardens and gardeners languish.

No matter what the weather, one of the things that thrill me on a July day is to be walking along a flower border and discover greenish white spearheads pushing up out of bare ground. Nearby will be a label reading "lycoris sanguinea," and while it is not one of my favorites, it lets me know that the Lycoris season is getting under way and that exciting things will be happening on through August, September and into October.

Aside from the fact that many lycorises are such beautiful flowers that anyone would covet them, it is certainly true that part of their appeal lies in being so "different"—with strange growth habits—and in the fact that we still have much to learn about them. There are problems of identification and nomenclature along with problems of culture; and there are wonderful opportunities for gardeners with a creative bent who may wish to cross-breed them.

Authors of garden encyclopedias and bulb books have not done a very good job of covering the genus *Lycoris*, and it is mainly through the experiences of bulb fanciers, reported in publications like this one, that we shall gradually accumulate a reasonably full store of factual information about these bulbs. Progress is slow, because lycorises just don't do things in a hurry. But each year we are able to tie up a few loose ends—to verify an identification, perhaps, to approximate a hardiness rating, to determine what conditions promote bloom in a particular species. In keeping with these thoughts the following report is offered.

### SPRENGERI-RADIATA HYBRIDS

From crosses of *L. sprengeri* and a fertile strain of *L. radiata* made in 1954 and '55, I began to get bloom in 1961, and through the current year (1963) have had some thirty scapes. They appear in August over a period of two to three weeks, covering the season when their parent species are also blooming. Varying among themselves in color, and to a lesser degree in form, they make a most interesting and beautiful display. One distinctive form has fairly narrow, smooth-edged segments of rich, dark purple-red (a good color reproduction of it appeared in the September, 1963 *Horticulture Magazine*). Others range through shades of rose to fairly light pink, but practically always with a faint purplish or lavender tinting. As flowers age, strong violet markings develop at the segment tips, no doubt an inheritance from the blue-tipped *L. sprengeri*. Segments vary in width and some are deeply colored along the midribs, but there is very little of the crisping and crinkling of edges so conspicuous in *L. radiata.*

Most umbels carry seven flowers, but there may be fewer or more, and they vary from about 6 to 7½ inches across, from tip to tip of extended stamens. The accompanying picture of ''parents'' and ''children'' (fig. 14) shows how the hybrids appear intermediate in form between the species. Since *L. sprengeri* and *L. radiata* do not at all resemble each other, the hybrids create a ''new look'' in the genus; they are unlike any other lycoris I have observed.

Regrettably, in spite of the great hardiness of *L. sprengeri,* the hybrids seem more susceptible to winter damage than even *L. radiata.* They make foliage growth in the fall, in the manner of *L. radiata,* and the bluish green leaves are hurt by near zero weather. In fact, though bulbs survive under outdoor cultivation here in Tennessee. I have never had one of them to bloom. All my flowers are on bulbs grown in a coldframe protected by a plastic-covered sash in winter. I think they will prove satisfactory in Mid-South and Deep South gardens, but will need protection wherever winter temperatures consistently drop to 5 degrees or lower. I still have more than 100 bulbs to flower and am hopeful that some individuals may prove hardier than the average.

Incidentally, if you have *L. sprengeri* and a fertile *L. radiata* (I presume it is really *L. radiata* var. *pumila*), the cross is easy to make, using either one as the seed parent. My seedlings with *L. sprengeri* as the seed parent grew off a little faster and were first to bloom, but now that a dozen or more of the reciprocal cross have also flowered, I can tell no difference between them; that is, the same variations occur in both lots. It is of interest, too, that the hybrids are highly fertile to their own pollen; and I have crossed them back successfully on both parents and on *L. haywardii.*

In previous writings in this and other publications I have used the term ''Sprenrad Hybrids'' as a convenience to designate these crosses. In the present issue of Plant Life they are given the permanent name, *L.* x *jacksoniana.*

## OTHER CROSSES

For any who may wish to try lycoris hybridizing, I will repeat that it is a fascinating activity and one can still get into ''on the ground floor.'' The one requisite is enormous patience for lycoris seedlings take a long time to flower (I haven't had one to bloom short of six years). It is true that our cultivated stocks of *L. squamigera* and the common September-blooming *L. radiata*—and in my experience, *L. incarnata. L. caldwellii, L. houdyshelii* and *L. elsiae*—appear to be completely sterile and thus useless to the would-be hybridizer, but it is possible now to get a fair number of seed-bearing kinds. They all seem to cross readily with each other. To date I have made the following crosses and have at least a few seedlings of each coming along:

**L. chinensis** x L. "cinnabarina"
**L. haywardii** x **L. chinensis**
**L. haywardii** x **L. sanguinea** and the reverse

**L. haywardii** x L. "sperryi" and the reverse
**L. haywardii** x **L.** x **jacksoniana**
**L. radiata** x **L. haywardii**
**L. radiata** x **L. chinensis**
**L. radiata** x L. "sperryi"
**L. radiata** x **L. sprengeri** and the reverse
**L. radiata** x **L.** x **jacksoniana**
**L. radiata** x **L. traubii**
**L. sanguinea** x L. "sperryi" and the reverse
**L. sprengeri** x **L. haywardii**
**L. sprengeri** x L. "sperryi"
**L. sprengeri** x **L.** x **jacksoniana**
**L. sprengeri** x **L. traubii**

The L. ''sperryi'' is unidentified Chinese species; see page 77, Plant Life 18, 1962.

Only the *sprengeri-radiata* seedlings have flowered thus far, but some of the others are five years old, and I look forward with eagerness to their blooming during the next few years.

Cross pollinating lycoris flowers is very simple. All anthers must be removed from the seed parent flower while it is in the bud stage, before pollen is released, to prevent self pollination. Pollen of the male parent is brushed onto the stigma of the seed parent flower; I do this on several sucessive days, beginning when blooms first open, but the first application is probably sufficient. Seeds are harvested in fall and planted immediately in pots or flats kept in a cool greenhouse. After two years in the containers, seedlings are transferred to the coldframe for growing on to flowering size. Undoubtedly there are other equally satisfactory methods for handling seeds.

### NEAR WHITES

For a number of years it has been possible to buy from mail order dealers as well as garden centers and even dime stores over the country lycoris bulbs under labels such as ''White,'' ''albiflora,'' ''alba'' and the like. When these bloomed they have always produced pretty flowers but if one ever turned out to be truly white, news of it has escaped me. With typical spiderlily form, similar to *L. Radiata,* they tend to vary in color somewhat, depending partly on temperature and light exposure at the time of flowering. In general the coloring involves soft pastel tints of cream, pale yellow, buff, salmon and pinkish—often with a deeper pinkish line along the middle of segments. Commonly they fade close to white a few days after opening.

Seeing a few here and a few there in different gardens and in different locations on my own place, I thought for years that they were probably all the same lycoris, the small differences noted among them being due to soil, light or some other cultural factor. To remove doubts I transplanted all of my stocks of this general type into one coldframe where they could grow under their various labels within a few inches or feet of each other under uniform conditions. Incidentally, they have prospered greatly and flowered freely in the frame which is covered with a sash in winter, for they are less hardy than *L. radiata* and really were never satisfactory bloomers when grown outdoors here.

Now, after checking the blooms carefully through several seasons, I am aware that in spite of a general over-all resemblance, different forms do exist. Mainly these fit into three groups, and it may clear up confusion if I list names under which I received bulbs, sources and dates, and the result of bloom comparisons.

First is a large group—a majority of the bulbs, in fact—which came under many names but have proved to be identical; they are the soft salmony tinted type named *L. elsiae* by Dr. Traub in Plant Life 14, 1958. In this group are ''L. radiata alba,'' from Bob Anderson, Los Angeles, Calif. (1948); ''L. radiata alba,'' from Rex Pearce, Moorestown, N. J. (1950); ''L. radiata carnea,'' from Pearce (1951); ''L. alba,'' from San Francisco Nurserymen's Exchange, through Wyndham Hayward, Winter Park, Fla. (1951); ''L. albiflora carnea,'' from Cecil Houdyshel, La Verne, Calif. (1952); ''L. alba,'' from Growers Exchange, Farmington, Mich. (1952); ''L. albiflora'' (two out of three bulbs), from Mrs. U. B. Evans, Ferriday, La. (1959); ''White No. 3,'' from B. Y. Morrison, Pass Christian, Miss. (1961).

A second group has flowers larger than the *L. elsiae* type, broader segments, crisped and reflexed, and little if any pinkish influence in the color but rather a pale, soft yellow throughout, which gradually fades toward white. It is an extremely pretty lycoris. Photographs of this form and of *L. elsiae* appear on pages 80 and 82 of Plant Life 18, 1962, and it is easy to see differences between them even in the black-and-white pictures. I received bulbs of this group as ''L. albiflora'' (one out of three bulbs), from Mrs. Evans (1959); as ''White No. 1,'' from Mr. Morrison (1960); as ''L. albiflora,'' from Mr. Morrison (1961), along with a note that this was from the original stock he received under this name from Japan while he was with the USDA in 1940; and as ''Cream No. 1,'' from Caroline Dormon, Saline, La. (1962). Miss Dormon wrote that her bulbs came nearly 20 years ago from Col. Russell Wolfe, Orangeburg, S. C., simply as a ''White'' lycoris.

A third group is what catalog writers might call ''improved elsiae,'' because they are truly bigger and better than the *elsiae* type. On strong scapes 20 or more inches tall, these have umbels up to 8½ inches across. The color is not very stable but runs through apricot shadings definitely to pink. A well developed scape is one of the finest lycorises imaginable. I have these in one small purchase of ''White'' lycoris from a local garden store (1959), where the owner advised me they had come from Van Waveren, in Holland, billed as ''L. alba''; and also in two lots of bulbs from Mr. Morrison (1959 and 1961) which he had received as ''L. albiflora carnea'' from the Walter Guille wholesale bulb firm, Syosset, L. I., New York.

Well over 90% of my near white lycorises fit into the three groups described above. There are a few individual bulbs, including a small-flowered deep pink one from Mr. Morrison, about which I am uncertain, and there are still others that have not flowered. All of these make lush leaf growth, starting in the fall in the manner of *L. radiata*, but leaf blades are perhaps twice the size of *radiata* leaves. Although not exactly common, near whites are well distributed among bulb fanciers in the South. Probably there are other forms I haven't seen. We all enjoy them but I am sure there are other gardeners along with me who would like to know what to call them. At present the names are hopelessly confused.

### A NEW YELLOW—PERHAPS

In October, 1962, a local garden center received lycoris bulbs from Springtime Bulb Farm (wholesalers), Lebanon, Ohio. They arrived in wooden cases stenciled ''L. aurea'' and ''Grown in Japan.'' But printed cards enclosed in the cases said: ''New Import—Hardy Golden Spider-lily—Plant 5" deep in semi-shade or sun. Bloom August in North, July in South. Height about 2 feet. Will bloom year after year if left in ground.''

For years my sense of curiosity has impelled me to buy samples of bulbs like these, although experience has shown that nearly all the Japanese ''aureas'' turn out to be *L. Traubii*, which is definitely *not* hardy here in Tennessee. But I was intrigued by the ''New Import'' and ''Hardy'' claims for these bulbs and so bought a couple of dozen at first and later an entire case (they were not expensive).

I've been able to observe these now through the 1963 growing season from foliage alone—none bloomed. Judging from the leaves, there were a few *L. Traubii* bulbs mixed in, but most of these really are something different. If the year's performance is typical, they make foliage in late winter and very early spring, in the manner of hardy types such as *L. squamigera*, and the leaves actually look like those of the rare hardy yellows, *L. chinensis* and L. ''sperryi.''

Of course these may turn out to be disappointing in flower, but they strike me as being worth watching. They really may be a hardy yellow lycoris—perhaps *L. chinensis* or L. ''sperryi'' or something similar. I suppose these bulbs were marketed all over the country, and I hope others who have experience with them will send reports to Dr. Traub.

### EFFECT OF HARD WINTER

As in many other localities, the 1962-'63 winter gave our Nashville, Tennessee area the coldest temperatures ever recorded. Mid-December and late January cold spells brought night temperatures of 4 below zero twice, 6 below, 7 below, 13 below and the all-time record of 15.2 below. All my outdoor-grown lycorises that make foliage in the fall were badly hurt. Leaves would have killed off entirely had there not been 3 or 4 inches of snow protection when the bitterest weather came. Leaf blades ''burned'' down to the snow line, and as a result there were very few blooms on the common *L. radiata* in September and none at all on my cherished white *L. houdyshelii*. The fertile *radiata* flowered fairly well; leaves were damaged all right, but this type always seems to bloom, anyway. No bulbs were killed as far as I can tell; all appeared to be sending up leaves as usual in the fall of '63.

The winter certainly proved the value of a coldframe for questionably hardy species. All my *L. elsiae* bulbs and other near whites are in a large frame with a plastic sash cover. It is not a tight frame at all and there was a little whitening of leaf tips by the extreme cold. But foliage survived and bloom was almost normal.

The hardy species that make foliage here in late winter and early spring were very puzzling in performance. All made excellent leaf growth, as it didn't start until our severest weather was over. But summer bloom was below par for several of them. There were nice blooms on *L. squamigera* and *L. sprengeri* but not half the usual number of scapes. Oddly enough, it was possibly the best year ever for L. incarnata, which flowered freely in all locations. *L. sanguinea* and *L. caldwellii* were about normal. Experience is showing that these do best under deciduous trees (mine are under dogwoods). They get sun during the foliage cycle but are shaded at flowering time.

*L. chinensis,* the rare hardy yellow, of which I received one bulb in 1958, produced a scape; it has not failed to flower now in three years. Just a foot away from it are several bulbs of L. ''sperryi,'' the other hardy yellow, but they didn't bloom. However, Miss Aileen Bishop, who has the original stock of L. ''sperryi'' here in her garden, had four scapes—not as many as usual.

We do not know whether to attribute the scarcity of bloom on certain species to the cold winter or to abnormal spring weather. The usual April showers never came; instead there was a hot, dry month with 26 rainless days, three of which set all-time records for *high* temperatures.

## MISCELLANEOUS NOTES

In correspondence with Prof. Ei-ichi Takemura, in Japan, Mr. B. Y. Morrison received a color slide and pressed flower of what is purported to be *L. straminea,* and I have been privileged to see them. The slide shows an umbel with three flowers open and four buds. Color appears to be ivory or very pale strawy yellow with no markings. Segments look fairly broad with smooth edges—no undulations—and tips are somewhat reflexed. Segments are longer than stamens but the pistil extends beyond them. The picture does not conform to descriptions of *L. straminea* I have read, but it is an interesting flower and different from any species I know. Unhappily, Prof. Takemura advised that he lost all of his bulbs in the 1958 Kanogawa hurricane and has been unable to locate any more in all of Japan.

Mr. Robert D. Goedert, Jacksonville, Fla., amaryllis dealer and fancier of many amaryllids, has been getting lycoris bulbs from Japan which will be interesting to watch. I have several test plantings, including bulbs he received as ''L. Vermillion'' and ''L. aurea Vermillion.'' Future bloom seasons will reveal what they really are.

Some bulbs I received back in 1957 from H. E. Saier, Dimondale, Mich., finally bloomed in September of this year. I believe Mr. Saier had imported them from India and they were labeled simply ''Nerine.''

They turned out to be a very nice form of *L. radiata*—apparently the same as those grown widely over the South.

Bulbs of ''L. purpurea'' that I have had from many sources have always turned out to be *L. sprengeri* upon flowering. There are still three lots of ''purpurea'' that haven't bloomed, and I keep hoping for something different, but the foliage looks just like *L. sprengeri*.

If you read this report and get the impression that names under which lycoris bulbs are sold mean little, please do not feel hard toward American dealers. Many of them are my good friends and I know they do the best they can. I am grateful for their making some very beautiful flowers available to us. Most lycoris bulbs marketed come from Japan. Economically, it is not usually possible for retailers to test grow and flower the bulbs before any are sold, so they have to rely largely on sometimes inaccurate information from suppliers. If even our advanced plantsmen and botanists are unsure about much of the lycoris nomenclature, you can hardly expect collectors, growers, shippers and retail dealers to be better informed.

EDITORIAL NOTE.—The fertile so-called *lycoris radiata* var. *pumila* is in fact the biological norm (diploid) of *L. radiata*, and should be indicated as *L. radiata* var. *radiata*. The larger, infertile form is a triploid.

Hardier forms of *lycoris* x *jacksoniana* can be expected among the progeny of selfed individuals; and also from the back-crosses on *L. sprengeri*, and crosses with other hardier species.—*Hamilton P. Traub*

## AMARYLLIS ROUND ROBIN NOTES, 1963

MRS. FRED FLICK, *Chairman, Carthage, Indiana*

A Round Robin is a letter club, consisting of ten to twelve members. A Robin should make a round in three months. When the Robin reaches a member he takes out his old letter; and includes his new letter. At the time the Round Robin is mailed to the next member, a courtesy card, or note is mailed to the Director of the Robin. This is the only way that a director can know the location of the Robin.

A member sends the Robin on in seven days, or less if possible. In case of illness, a member of the family should be instructed to mail the Robin on to the next member.

The postage is usually from fifteen to twenty cents on the Robin.

[The following notes were extracted from Round Robin letters by the Chairman of the Amaryllis Round Robins.—**Editor**]

Len Woelfle.—''It has been an exciting year for me; as three new *Hymenocallis* hybrids bloomed for the first time. One was a new golden yellow with a greenish overcast. It was much darker yellow than 'Sulphur Queen'. The greenish glow gives excitement to the flower. I have nāmed it *Hymenocallis* clone 'Green Gold'. It is a back cross of *H.* clone 'Pax' on *H.* amancaes.

The second one to bloom has been named *H.* clone 'Fiesta'; and it is a glorified 'Festalis', if that is possible. At least it is different; a little larger in all parts; a more robust plant; and the umbel is fan-shaped like *narcissiflora* instead of radial, like the usual Festalis.''

Opal R. Flick—''Len Woefle's hybrid *Hymenocallis* clone 'Pax' bloomed beautifully for me in early June. Our Garden Club Flower Show was to be the middle of June. How I wished that it had waited to bloom for the Show. Then to my surprise, it sent up a second scape; and the day of the Show had seven lovely blooms and buds.

I entered it as a specimen Ismene. It really stood out, when compared with the others entered. Naturally, it won the blue ribbon.''

## LYCORIS HYBRIDS REPORTED FROM JAPAN

Ei-ichi Takemura, *Tokyo University of Education, Otsura, Tokyo, Japan*

### HYBRIDS BETWEEN LYCORIS AUREA AND L. RADIATA

[The following summary is taken from an article published by Dr. Takemura in the Botanical Magazine, Tokyo, Vol. 75. Pp. 324—330. 1962.—*Editor*]

### SUMMARY

1. Morphological and cytological studies were carried out on F-1 plants raised from *Lycoris aurea* Herb. ($2n = 14 = 8V + 6R$) x *Lycoris radiata radiata* (syn.—*L. radiata* var. *pumila* Hort.), $2n = 22 = 22R$.

2. The morphological characteristics of the F-1 hybrids are intermediate between the parents and resemble closely the natural hybrid, *L. albiflora* Koidzumi.

3. The chromosome number in somatic cells of the F-1 plants are $2n = 18 = 4V + 14R$, i. e., the sum of the numbers in the gametic cells of both parents.

4. At the 1st metaphase in microsporogenesis of F-1 plants, 4 heteromorphic triplets and 3 bivalents are usually observed.

5. This artificial hybrid is almost completely similar to *L. albiflora* Koidzumi in morphological characters, karyotype, chromosome behavior in meiosis, etc. These facts apparently prove that the view of Inariyama that *L. albiflora* Koidzumi may be a natural hybrid between *L. aurea* and the diploid *L. radiata radiata* (syn. *L. radiata* var. *pumila* Hort.) is correct.

## AMARYLLIS BREEDING REPORT, 1963

C. J. Crochet and Mrs. J. S. Barry, *Rt. 1, Prairieville, Louisiana*

Mature seeds from selected crosses are planted in six-inch red clay pots each spring. The seedlings are kept growing in the greenhouse for a full year and planted in open beds in June and July of each year. The beds are five feet wide and seedlings are spaced four inches apart by using a board with notches cut at four inch intervals. A bulblet is planted so that the entire bulb is covered with soil. Amaryllis beds are tilled before planting, and we incorporate bone meal, cow dung, German peat, and sand, mixing well with the soil. Beds are 100 feet long and are 4 inches higher than the surrounding soil surface, to allow for good drainage (see Fig. 15).

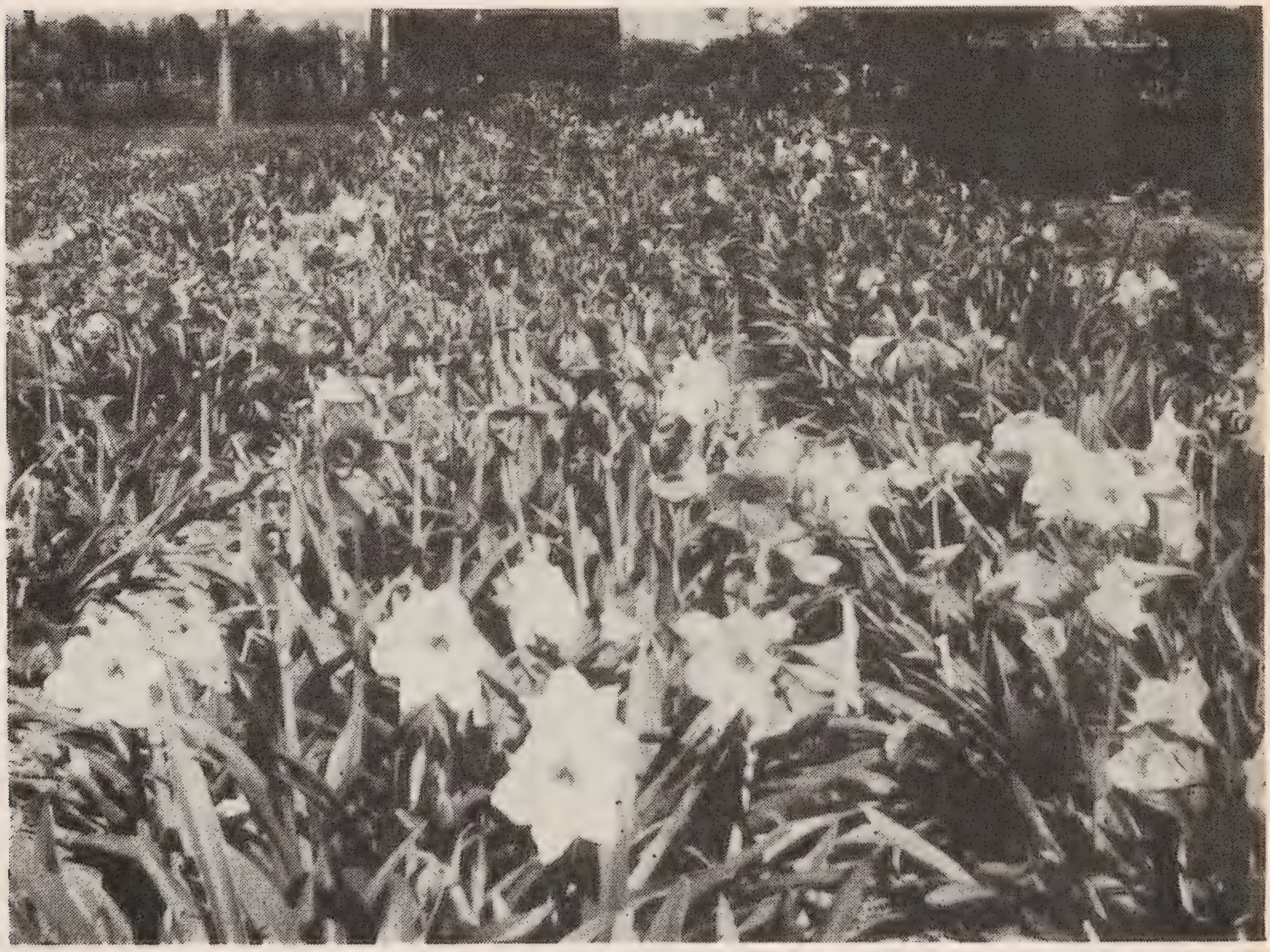

Fig. 15. General view of hybrid Amaryllis beds of C. J. Crochet and Mrs. J. S. Barry at Prairieville, Louisiana, 1963.

For the first year, weeding the beds is a necessity, but for the following years, weeding is at a minimum because the amaryllis leaves tend to shade the beds, thus discouraging weed growth. Growing from 4 to 5 thousand seedlings per year makes close planting necessary as growing space would soon be exhausted. Each summer seedlings are shaded with sesbania, which gives dappled shade. Sesbania is planted from seed in the middle of the beds and thinned to one plant per five foot interval. The following spring they are easily removed from the beds, leaving a valuable nitrogen supply from their decomposed leguminous root systems. Each November, the *Amaryllis* beds are mulched with three inches of sugar cane waste, which is received shredded and packed in bales. This mulch is used as a protection against cold damage. It does not pack, it allows for rain penetration, and provides warmth through its heat of decomposition. This mulch is replenished each November.

The sugar cane waste serves four purposes: (1) it keeps the ground surface cool during the summer months (2) it adds organic matter to the surface of the soil (so important in successful *Amaryllis* culture), (3) it insulates the beds during winters, and (4) it keeps weeding to a bare minimum. With this procedure, no bulbs were lost during the extremely cold winters of 1962 and 1963.

''Fertilome'' is applied in March of each year at the rate of 25 lbs. per 5 x 100 foot bed. Lush leaf growth does not permit more than one application per year and ''Ra-Pid-Gro,'' a foliar nutrient is applied each month until October, when the last application is made.

This procedure has resulted in spectacular bulb growth and many seedlings bloom in three years.

All seedlings are kept and through the years about 50 have been segregated for further performance evaluation. These will be vegetatively propagated. All have the worthy characteristics of color, size, texture, uniqueness, growing ability, and hardiness. (see Fig. 16).

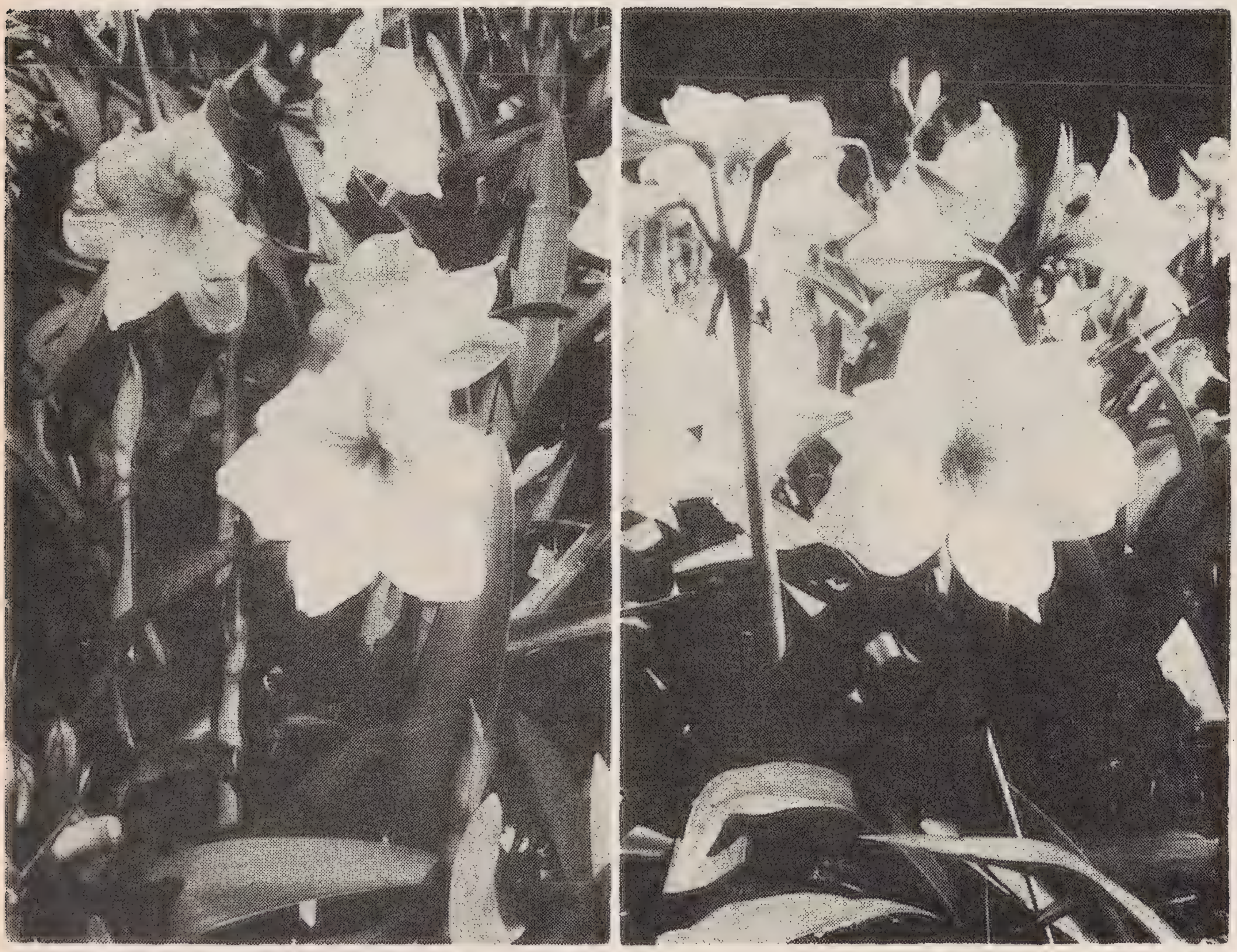

Fig. 16. Crochet and Barry hybrid Amaryllis—upper left, red and white; lower left, rose and white; right, huge, heavy-textured, full form white (from white Dutch x 'White Giant').

No seedling is considered as a subject for propagation unless it conforms to well defined standards. This group includes the color range from white through the picotee types, striped red and white, orange and white, salmon, rose, pink, scarlet, and darkest red.

What follows are some of the principles we used in producing bulbs from seed: (1) Work toward some well planned objective; (2) Use only the best seedlings or named varieties in making crosses; (3) A cross from two inferior flowers will invariably produce inferior progeny; (4) With but few exceptions, selfs are not desirable in upgrading the quality of *Amaryllis;* (5) Never produce seeds on first year blooms (the drain of energy may keep the bulb from flowering the following year); (6) No bulb should be forced to make seed for any two consecutive years; (7) Carefully label all crosses as to pod and pollen parent. As a result, those which produce superior progeny can be duplicated in the future.

# FLOWERING OF AMARYLLIS CALYPTRATA HYBRIDS

W. Quinn Buck, *Los Angeles State & County Arboretum, Arcadia, California*

On October 22, 1962, the first flower on one of our *Amaryllis calyptrata* hybrids began to open. It had been felt that the seedlings, sown on June 15, 1961, must be far from blooming, even though growth had been vigorous; so it was a great surprise to discover an unnoticed spike.

This hybrid of 'Nivalis' (Ludwig) x *Amaryllis calyptrata* was an interesting blending of the parents. Our photograph (Fig. 17) shows the dominance of the *A. calyptrata* in general shape; as the flowers matured the lower petals and sepals curved inwardly even more, and the other segments undulated as in *A. calyptrata.* The green color was not evenly distributed, going especially to deepen and extend the green throat area of the white parents. The flower was dull white, with large green throat, and with some reddish color on the reverse. The texture took on some of the *calyptrata* smoothness. The pink stamens and pistil of *A. calyptrata* carried through, to give a spot of color.

Of the fourteen seedlings from this cross a second flowered soon after the first, with an interval before additional spikes appeared. The 1963 crop of spikes has been quite good, and up to this time (August 15, 1963) most of the fourteen have flowered at least once, and some have had as many as three and four spikes scattered over the months. Many of the later flowers have been surprisingly wide-seged, with a flatter form like that of the Dutch hybrid parent. Some spikes have shown three buds, while others have had only two. Most of the seedlings began producing offsets very early, and they now have their pots crowded.

Of a second cross, 'Ludwig's Dazzler' x *A. calyptrata,* about half of the 204 seedlings show many offsets. This producing of offsets cannot yet be correlated with other characteristics. This second cross was also planted June 15, 1961, but up to now most of the progeny is unflowered. One spike was a surprising picotee; a narrow pink line edged all of the tepalsegs. Two spikes have shown interesting brown lines in the petal midribs. The foliage of this second cross seems a darker green, while the small group shows a tendency to be yellow-green.

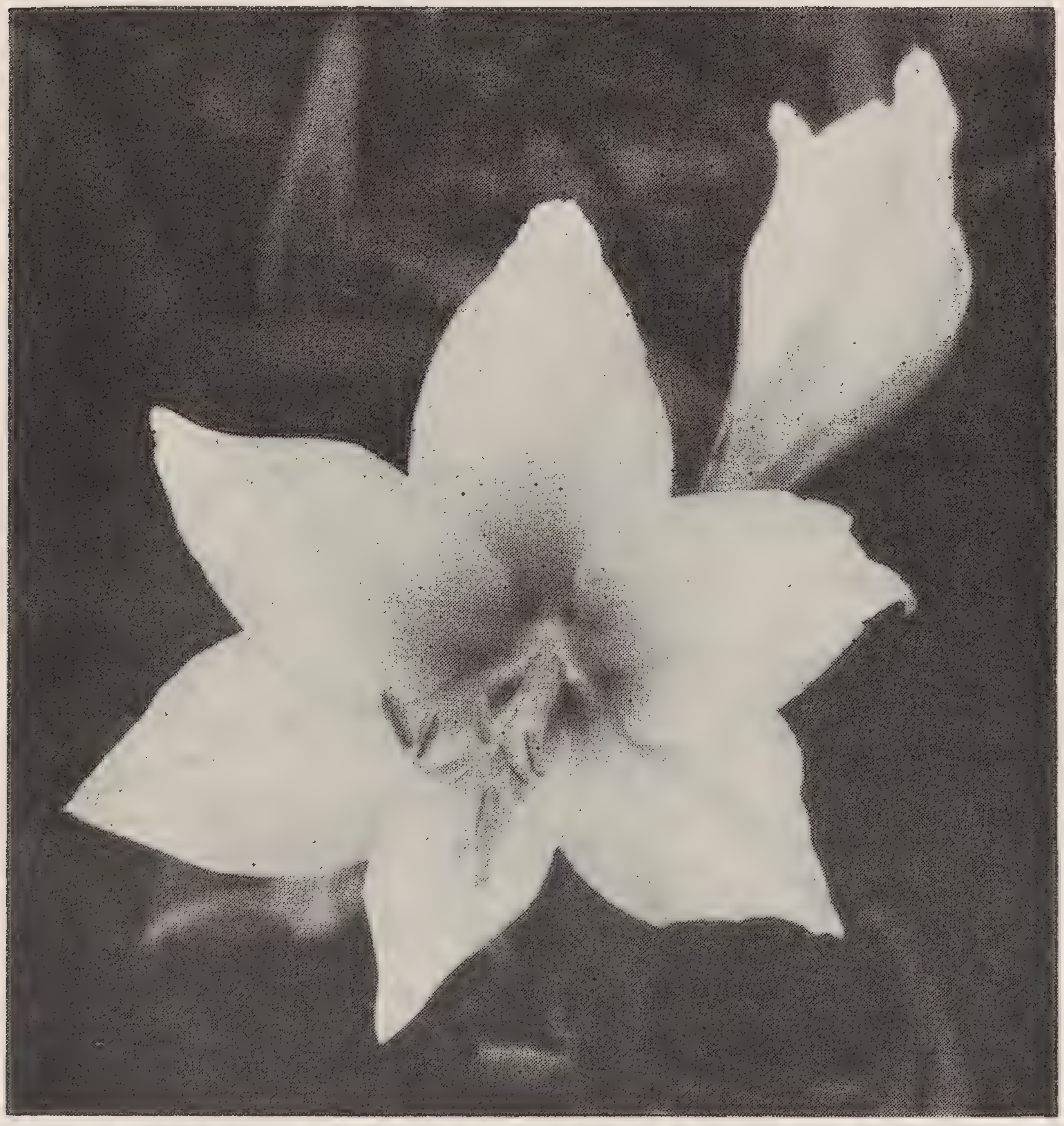

Fig. 17. Hybrid between *Amaryllis* clone 'Nivalis' (Ludwig) and *A. calyptrata*, an interesting blending of attributes of the parents, made by W. Quinn Buck of the Los Angeles State and County Arboretum, Arcadia, Calif. Photo by Jack V. McCaskill.

Earlier observations of a dominance of *A. calyptrata* in leaf width and shape do not seem to be holding true as the bulbs mature.

So far no individuals have been fertile when selfed, cross-pollinated or back-crossed, suggesting consistent triploidy as a strong possibility that should be investigated.

# THE OUTSTANDING ANGELL HYBRID AMARYLLIS

W. QUINN BUCK, *L. A. State and County Arboretum, Arcadia, California*

The *Amaryllis* hybrids developed at Loma Linda University by E. A. Angell have both horticultural and historical interest because of the source of the original bulbs from which they have been developed.

In 1934 Mr. Angell bought three bulbs from the Henderson Experimental Farm near Fresno, Calif. One of these, a red and white hybrid of the Luther Burbank strain, flowered and set seed. Three years later a solid red amaryllis of the Burbank material was added to the Angell breeding stock. It was these two Burbank bulbs which were the sole foundation of the Angell strain developed during his years at Loma Linda University, Loma Linda, Calif.

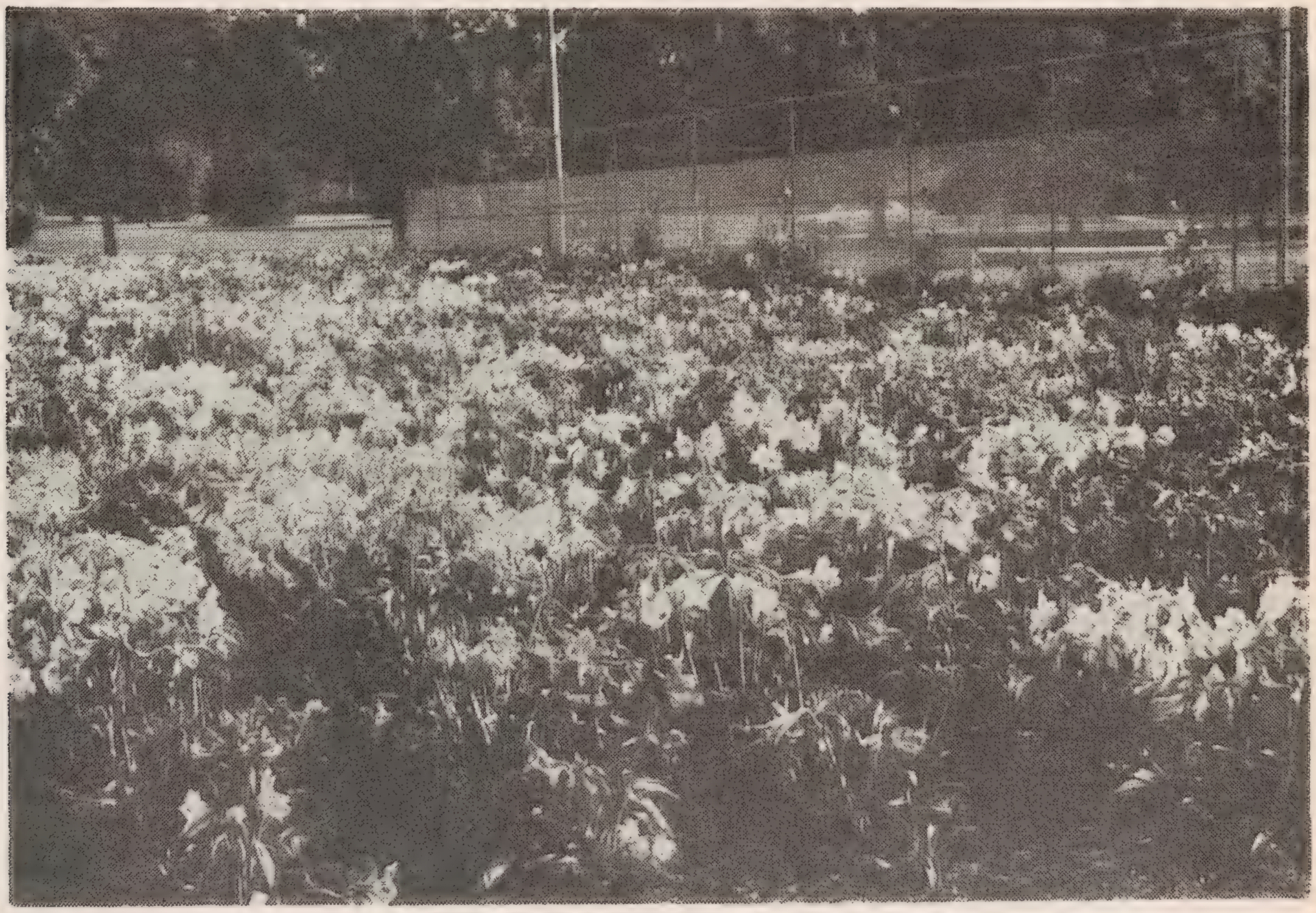

Fig. 18. View of the Angell hybrid *Amaryllis* field near the tennis court at Loma Linda University, showing many of the Angell near-white hybrids.

When Mr. Angell arrived at the University, where he was superintendent of grounds for twenty-three and a half years, until his retirement in 1961, he brought with him seed pods from the two original bulbs. These seed were planted and became the first generation of many successive years of breeding. Mr. Angell's sixteenth generation is now ready to be planted in the open field. (see Fig. 18).

Color, form, hardiness, free-flowering quality, and vigor have been prime considerations when Mr. Angell has chosen parents for his many crosses. A tremendous range of color from pure self-colored reds and oranges, through pinks and occasional lavenders and greens, to clear near-whites of exceptional quality, has resulted. The color patterns and variations in form are indicative of Mr. Angell's working to get them. (See Fig. 19.) He has sought ''red'' foliage in many of his hybrids, and the result is great numbers of clones with handsome bronze foliage. Many spikes produced six buds, and the most floriferous have had as many as eleven or twelve buds.

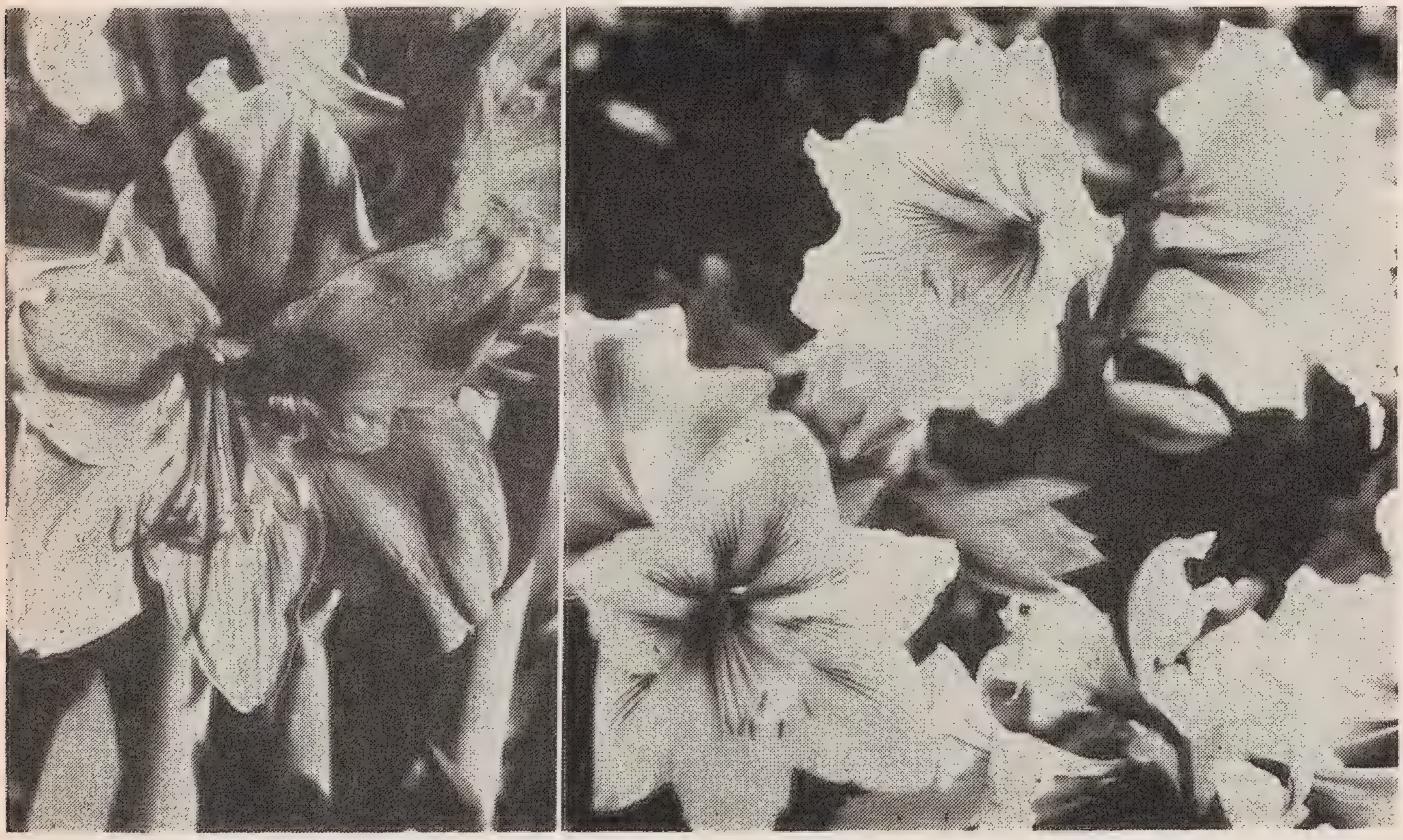

Fig. 19. Closer view of some of the Angell *Amaryllis* hybrids, grown at Loma Linda University, Loma Linda, Calif.

An example of Mr. Angell's keen interest in hardiness is his selection last winter of some eighty clones that remained green and only slightly damaged after unusually heavy frosts, and temperatures as low as 20° F. From crosses involving this group he is hopeful of getting even greater hardiness than his strain has shown up to now. Among the selections with exceptional hardiness, Mr. Angell found some of his bronze-leaved ''pets''; so this character can be included in much of this line of breeding.

In evaluating Mr. Angell's hybrids in the field, it seems that his near-whites are the most outstanding for quality, although this may come from his having dug more of the reds for sale. It is quite fair to say, though, that the Angell strain is unquestionably the best commercial strain being grown in California, and its origin in the Burbank strain gives an added interest.

# INTERRELATIONSHIPS OF SOME GARDEN CRINUMS

L. S. Hannibal, *Fair Oaks, California*

We owe Miss I. C. Verdoorn of Pretoria a sincere vote of recognition for her clarification of the status of *Crinum macowanii* Baker because J. G. Baker's original description of 1878 was unfortunately confused with *C. moorei* from Natal. And of equal importance we can report that *C. macowanii* was used some fifty years ago by Luther Burbank for breeding purposes. The hybrid *C.* clone 'Luther Burbank' which he developed has now been confirmed to be a cross of *C. macowanii* with *C. yemense.*

In the April 1956 issue of the South African Journal of Botany Miss Verdoorn reviewed and properly described *C. macowanii.* She found that Baker's description of this plant which was published in the Gardeners Chronicle of 1876 was confused with *C. moorei,* but that the Kew Herbarium lectotype: Mac Owan 2122(K) was typical of the *C. macowanii* species native to the Transvaal. Her study is quite comprehensive in that it covers a number of the geographical variants found in South Africa and provides a proper description of the species.

*C. macowanii* resembles *C. bulbispermum* in a number of general respects, but the plant is of lower stature and the glaucous recurved foliage is slightly broader and seldom more than twenty inches long. The scape is quite sturdy and rarely taller than 14 inches. The eight or ten blossoms have very heavy tepaltubes and short pedicels. Their shape is like that of a slender white ''Cottage Tulip'' with the keels of the tepalsegs colored a distinct rose red. The anthers are black and the ripe fruit are beaked.

The species is scattered over an area ranging from Port Alfred on the Indian Ocean up through Natal and the Transvaal to Johannesberg and north to the mountains of south Rhodesia. The high Transvaal forms are quite winter hardy as they experience some frost. The plants are normally found in dry stream beds. In habitat it can be considered a desert species.

Experience here in the Sacramento valley suggests that the high Transvaal forms are quite winter hardy if given good drainage. The plants desire full sun and only an occasional watering. The bulbs flower in early July or August, normally producing two scapes. Those received from the highest elevations are the earliest to flower. Seed sets without difficulty if pollen is employed from clones derived from different localities. Seedling plants offer no difficulty in culture except that they are quite slow growing and require some protection in winter until the bulbs reach appreciable size. The plants probably take ten years to reach maturity. Offsets have never been observed.

*Crinum macowanii* overlaps in a number of areas where *C. moorei, C. bulbispermum, C. graminicolum* and other species are normally found. We would expect some crossing in the wild with transitional forms being reported if the species were compatible. Apparently such do not occur in sufficient quantity to attract attention. Breeding experience by the writer tends to bear this out—*C. macowanii* takes on *C. bulbispermum* with considerable difficulty and the hybrids are very slow growing and difficult to flower; *C. macowanii* on *C. Moorei* produces a slow growing plant which resembles *C.* clone 'Louis Bosanquet,' but with much broader foliage. In view of the fact that *C.* clone 'Louis Bosanquet' has dark grey pollen and other features which tend to point to *C. macowanii* genes being present we had wondered for some time if *C. macowanii* was involved. It appears that *C.* clone 'Louis Bosanquet' may be a cross of *C. bulbispermum* and *C. macowanii.*

However, the major surprise came with the crossing of *C. macowanii* and *C. yemanse.* The seedling vigor is particularly noticeable in those hybrids involving *C. yemense* (Burbank's selection) possibly because the Burbank plant may be a tetraploid as it is larger than the van Tubergen form (Plant Life *18,* p.30, 1962). The foliage of the latter *C. yemense* x *C. macowanii* is uniquely strap shaped, being about three inches wide over the full forty inch length; it is borne semierect on a 18-inch high pseudo neck and is slightly recurving. The final realization that this plant and the old *C.* clone 'Luther Burbank' were identical was quite unexpected, but it appears likely that Luther Burbank did cross *C. yemense* with a *C. macowanii;* however, if he did, he apparently used a low veldt form as his clone requires warm weather to flower properly. Both Burbank's and the writer's plants have waxy white, tulip shaped blossoms on long curved tepaltubes. The anthers are dark, the hybrids fertile and the fruit beaked. Since the writer has grown F-2 and F-3 seedlings from the Burbank clone and has noted quite a range of segregates it should be of no surprise to find that some of the segregates are quite like *C. macowanii.* In fact it was such F-2 stock backcrossed onto *C. bulbispermum* which gave rise to the writers *C.* clone 'Cape Dawn' which was described in the 1961 Plant Life. This apparent discovery concerning the parentage of *C.* clone 'Luther Burbank' now completely supercedes the statements made by the writer concerning it in Herbertia *9,* p. 150. It is however, an interesting fact that *C. macowanii* and *C. yemense,* which seemingly do not resemble each other, appear to have a relatively close relationship or origin. This view is supported by the fact that the *C.* clone 'Luther Burbank' hybrid is the only one thus far encountered by the writer which produces random F-2 generation seedlings typical of a close or intra-specific hybrid. A restudy of the plants shows some common features. It is uncommon, though, to find cases where breeding discloses relationships that morphology neatly disguises. Since these plants appear to be of a common source it would be of interest to look for related species in Rhodesia, Kenya, Tanganyika or Ethiopia. There is a plant around Lake Victoria which resembles *C. yemense,* and *C. abyssinicum, C. Kirkii, C. scarbrum* and others need reinvestigation.

Further crossings by the writer has disclosed that *C. crispum* (now considered a form of *C. Polyphyllum* according to Cythna Letty in her text) will not cross with *C. macowanii,* despite the fact that there are many similarities including beaked fruit. Attempts to cross *C.*

*macowanii* with *C. moorei,* as mentioned above, have not been overly successful. Growth is slow and the seedlings are spindly. However, *C.* clone 'Luther Burbank' F-2 seedlings take on *C. moorei* with more ease. The foliage is long and uncurved, but at best it will take the bulbs ten years to reach flowering size. This latter behavior is quite surprising as the presumed cross of *C. moorei* and *C. yemense* (Burbanks 'White Queen') is quite vigorous. We can only conclude that *C. moorei* and *C. macowanii* have little attraction for each other.

Most crosses of *C. macowanii* on *C. bulbispermum album,* which is probably the *C.* clone 'Louis Bosanquet' cross, have not been found

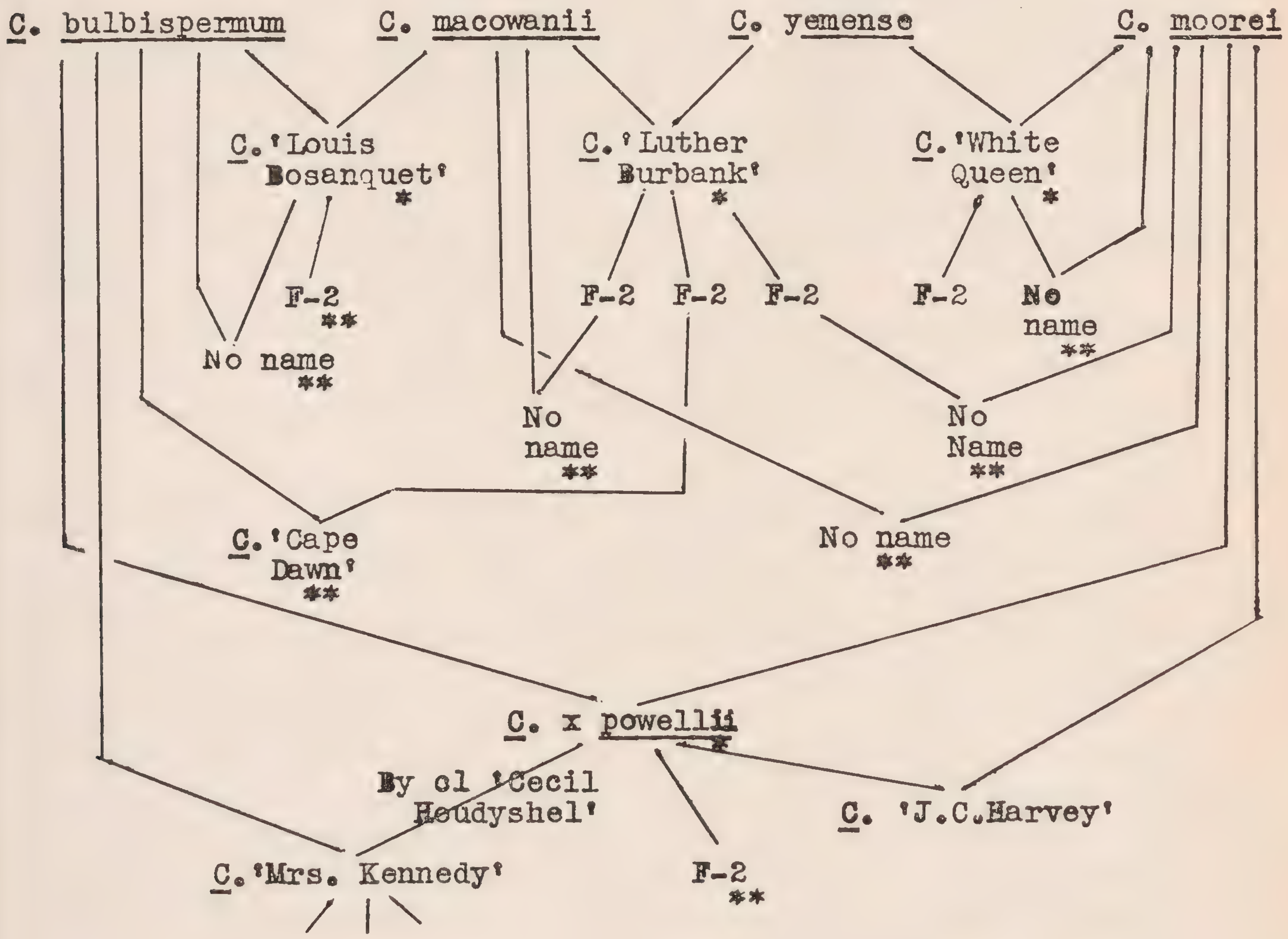

Fig. 20. Experimental confirmation of interrelationships of some *Crinum hybrids.* * Existing hybrids duplicated by writer by recrossing presumed parental species. ** New hybrids developed by writer.

of sufficient value to keep, but crossings involving the Orange River and Kimberley red-flowered form of *C. bulbispermum* are quite dark in color, and are considerably hardier. It is possible that the bulbs which the writer once saw growing in Berkeley were of this hybrid composition in lieu of being red *powelli.* The plants multiply rapidly and the foliage is half the width of the *C.* x *powelli* crosses.

The writer's 'Cape Dawn' hybrids, which are *C.* clone '*Luther Burbank'* crossed on *C. bulbispermum* differs from the Bosanquet type of cross mostly in vigor and size. The latter has foliage some 8 feet long and a single bulb often makes four or five scapes with 18 or 20 blossoms in a single season. The pollen is sterile. In contrast the smaller 'Louis Bosanquet' cross has viable pollen and occasionally produces seeds. The umbels are not what one could call outstanding.

In the 1962 issue of Plant Life the writer pointed out the value of determining the interrelationships of Crinum species and hybrids if breeding progress was to continue. The use and relationship of *C. macowanii* to the other Cape species is a distinct revealing. Similarly, *C. yemense* may have had far more use than generally conceded in the breeding field. It is now possible to pinpoint the parentages to a number of our *Crinum* hybrids. The chart shown in Fig. 20 outlines the interrelationships discussed above, and we can gain some indication from this as to future breeding breakthroughs. Apparently most hybrids have viable pollen and one can cross back onto a number of the species to obtain additional hybrids. If one backcrosses onto a parental species there is a good probability of the backcross being very hardy and capable of producing some seed. *C.* clone 'Mrs. Kennedy' represents a *C.* x *powelli* 'Cecil Houdyshel' backcrossed onto *C. bulbispermum album* and as such is quite a potent breeder with considerable promise of future use. Backcrosses of *C.* clone 'White Queen,' *C.* clone 'Luther Burbank' and others are also on the way and if viable as expected then additional breeders can be contemplated.

One item of interest which requires further study is Dr. Edgar Andersons hypothesis that an F-1 hybrid is the geometrical average of all dominant genes. When one examines the bulbs, foliage, and flowers and habits of *Crinum* hybrids one eventually discovers the dominant combination of features which are inherited from the parental plants; and in all instances so far examined *Crinum* hybrids are in accord with Dr. Andersons views. The long, recurved, channeled characteristics of *C. bulbispermum* foliage may dominate over the *Moorei* foliage in most *powelli* hybrids, but when closely examined the *powelli* foliage is broader, less recurved and less channeled. One can cite a great number of other instances, and the only factor which seemingly confuses the issue is hybrid vigor, or lack of vigor. This attribute increases or decreases a plants physical proportions sufficiently to mislead the evaluator unless he is aware of such behaviorism and is on the alert to take it into consideration.

## SECOND HYBRID GENERATION SEEDLINGS OF **ALSTROEMERIA X ORPETIAE**

[Selfed seeds of *Alstroemeria* x *orpetiae* with lilac colored flowers, have been distributed to various correspondents. Results obtained by two growers with these seeds are reported here. It is hoped that others who have received them will report in the Amaryllis Year Book.—*Hamilton P. Traub*]

### 1. Report from Grant V. Wallace, **Berkeley, California**

In July, 1961, Dr. Hamilton Traub kindly mailed me some seeds of an Orpet *Alstroemeria* hybrid: *A. violacea* x *A. pelegrina alba,* collected from F-1 selfs. As usual, not many germinated, but one sturdy plant produced by these seeds bloomed in the spring of 1963. The flowers were very fine: large, and creamy-white, with very few spots—one might truthfully say, with *no* spots. This plant had a rugged career: snails ate it to the ground the first year. However, the tubers produced a perfectly good cluster of stems in 1963, with the result noted above.

### 2. Report from Burr Clouette, **San Diego, California**

In 1961, seeds of the Orpet *Alstroemeria* hybrid from self-pollination were received from Dr. Traub. These were planted and in due course fifteen seedlings appeared. Up to 1963, three seedlings have bloomed. Two are much like the parent, that is flowers lilac with darker blotch and streaking. The third has white flowers with small yellowish or chartreuse blotch on the two upper tepals, and a few greenish markings in and around the blotch.

The leaves of all of the seedlings are dark glaucous green, but the stems of the two seedlings with colored flowers are reddish whereas those of the seedling with the white flowers are light green.

## A NEW BI-GENERIC HYBRID— X SYDNEYA MORRISII

Katherine L. Clint, *Brownsville, Texas*

We must thank a sudden lucky impulse for this beautiful new hybrid, for neither my husband Morris nor I are given to promiscuous crossing in the Rain Lily group. Someone had requested seed of *Habranthus immaculatus,* which is not always easy to supply since the species does not bloom heavily and usually requires hand pollination. Even this is tricky because the interval between the opening of the anthers and drying of the pollen beyond use is very short. On this particular day, I had checked my lone blossom of *H. immaculatus* frequently but misjudged the time and found that I had lost my opportunity. Thoroughly disgusted and disappointed, I suddenly remembered the flower of *Zephyranthes bifolia* in the greenhouse. This had been open for several days and when I discovered that the pollen was neither fresh nor plentiful I almost failed to use it. Actually, I think my action was inspired more by pique at the loss of *H. immaculatus* seed than optimism over the possibility of a bi-generic cross. I remember being quite surprised when signs of fertilization were soon evident. Had the flower been pollinated by insects before I applied *Z. bifolia* pollen or did we have prospects of a fine hybrid cross?

The capsule matured rapidly and produced an unusual number of seed—about 90, which were carefully planted and watched closely. This was on May 26, 1960. Germination was above average and the exceedingly rapid growth of the seedlings seemed to foretell their hybridity. In August of the same year, about 65 bulbs were transferred to a long, deep flat filled with a rather rich, humusy soil mix. In this they grew apace and it was soon evident that we no longer need have any doubts of obtaining a true cross. The deep, shining green leaves (those of *H. immaculatus* are quite glaucous) were very similar to those of the pollen parent but already much longer and broader.

In the late summer of 1961, six of the larger bulbs (now about the size of a paper shell pecan) were potted in a standard 7″ clay pot, using the same rich soil with limestone chips added to the mix and a layer several inches deep of the same stone in the bottom for drainage. It was decided to keep these growing continuously in the greenhouse through the winter if at all possible, even though both parents need a dormant period. The remainder of the bulbs were planted in a raised bed in the shade house, where they received care until late fall when they were allowed to go dormant. We were to regret planting them here, for the severe freeze of January, 1962 and subsequent drought caused heavy damage. Some bulbs were lost completely and all were badly set back.

On January 6, right in the middle of the cold weather, a husky bud was discovered on one of the bulbs in the greenhouse. One can imagine the excitement in the Clint household. What would the flower be like? Surely, with two such beautiful parents, one couldn't lose. Due to the extreme cold, the scape developed very slowly. For almost a month, the bud sulked just above ground level and we were in constant fear of losing it. At last the weather warmed, the scape shot up unharmed and on February 7, the flower opened and we were delighted. It was indeed a lovely thing, resembling *H. immaculatus* in size and shape but the color was sensational. Though often seen in *Amaryllis* hybrids, it is completely new to the Rain Lily group—carmine rose RHS 621 to 623, with a white center and a small green throat. Spathe, scape and flower form were typical of *Habranthus* while the leaves now looked more like a small *Amaryllis* than either *Zephyranthes* or *Habranthus*. In April, one of the bulbs in the shade house bloomed. It was a larger, more open flower, with similar coloring except that the carmine rose was a much deeper shade. The early maturing of these two and about 8 other seedlings was not reflected in the group as a whole, since only a little over half of them have bloomed to date. Had all been kept in a healthy, growing state perhaps the story would have been different. The flowers have been very similar in appearance, although there is, of course, some variation in depth of color and form. The size of the blossoms has increased with the age and size of the bulbs, the average being 3″ and the largest more than 4½″ in diameter. An extra dividend is the year round growing and blooming habit.

As in most bi-generic hybrids, the seedlings appear to be sterile. Repeated attempts to self-pollinate, cross-pollinate with sister seedlings

(CONTINUED on page 34.)

# 4. AMARYLLID CULTURE

[REGIONAL ADAPTATION, SOILS, FERTILIZATION, IRRIGATION, USE IN LANDSCAPE, DISEASE AND INSECT CONTROL, ETC.]

## EXPERIENCES WITH AMARYLLIS SPECIES

WILLIAM MORRIS, *89 Mills Street, Warners Bay,*
*New South Wales, Australia*

After reading Dr. J. C. Smith's "Amaryllis Species Notes" in the 1962 Amaryllis Year Book, and his request for reports from other growers, I decided to write this article.

Since first becoming interested in *Amaryllis* about five years ago, I very rapidly acquired a major interest in the species and old or new interspecific hybrids. I grow the wonderful Dutch hybrids and enjoy them, but I always look for something different and that is what the species reveal.

There were very few *Amaryllis* species in this country—at least that I could locate in N. S. W.—so to begin with I had to try to obtain seeds of as many as possible from overseas, mainly from Brasil, Bolivia and the U. S. A. I received seeds of *A. aulica* from Mrs. Clint about four years ago and at present scapes are appearing for the first time on four bulbs. The half dozen or so seedlings have multiplied very rapidly by offsets and I now have clumps of dozens of bulbs. The bulbs were evergreen until last summer (it is now autumn here July 5, 1963) when they went completely dormant for about 8 weeks. This seems often to be the way with many seedlings. Going dormant announces that they are large enough to flower after going through the earlier "grand period of growth".

*Amaryllis pardina* flowered here last spring for the first time from a bulb I located in cultivation in Sydney. How long it has been in this country is not known, but it is not widespread. I was in Northern Queensland when it flowered. I was told that it was highly spotted.

I received *Amaryllis reginae* from Bolivia, and *A. calyptrata* from Brasil. The first is very vigorous and is now reaching flowering size. The larger bulbs have produced quite a crop of offsets. All offsets—*aulica, pardina,* and *reginae* have done well when planted in the ground.

With me, *A. calyptrata* has been much slower contrary to Mr. Buck's findings (Amaryllis Year Book, 1962, p. 131). My plants have not grown rapidly even under glass with feeding. When planted out in the ground they almost ceased to grow, and they have now all been put back into pots in the glasshouse (unheated) where they still grow slowly. One seedling seems different in a number of ways and has grown much better than the rest. As the seeds came from garden grown plants in Brasil, I am wondering if this one is a chance hybrid with another *Amaryllis* species in the garden. *A. calyptrata* seedlings have always gone dormant in summer whereas this one has not, and it also has pigmented leaves in contrast with the rest with plain light green leaves. Only inspection of the flowers later will solve this riddle.

*Amaryllis evansiae* from U. S. A. grown seeds has grown quite well. Now about 30 months old, two of them appear to be mature, and I am hoping for flowers in the spring. Dr. Smith reported his bulbs tended to rot or decline. Mine have not done this either in pots or in the ground. The two largest bulbs have been in pots all the time while most of the rest were planted out. As these did not respond by rapid growth after a season, they have been repotted and put back in the glasshouse. In potting these and other *Amaryllis,* I always use plenty of crocks—from 1/3 to 1/2 the pot height.

*Amaryllis belladonna* L., the American Belladonna, seeds were received from the U. S. A. and Bolivia at about the same time as *A. evansiae.* They have not been as rapid growing as the latter. At this time, only one bulb may be large enough to flower. However, they have not been difficult in any way, simply slow. They have been pot grown from the beginning—except for a few in the ground as an experiment. I feared that our winter rain, when they were dormant, might rot them. So far I can not comment on those in the ground as they have not been through a winter yet.

*Amaryllis psittacina* var. *decorata,* from Dr. Traub, has grown very well and is near flowering size I believe. I am waiting on this one with impatience as the description of its flower color intrigues me. *A. psittacina* var. *psittacina,* received only last year from Mr. Davis, has grown very well and looks half grown already.

*A. vanleestenii* (?), from Bolivia, has been the slowest of all from seeds. At the end of its second growing season its largest leaves are only $2\frac{1}{2}'' \times \frac{3}{8}''$.

*Amaryllis striata* in one of its forms bloomed here last year—3 years from seeds. I was very pleased with it. Some pollen saved from *A. pardina* gave a good pod of seeds and about a dozen seedlings are growing well now.

*Amaryllis aglaiae* from Dr. Traub had a short growing season this year, and has been dormant for the last month. As the weather is getting quite cool now, I do not expect it to put up more leaves. With a long rest, it may flower in the spring.

*Amaryllis* sp. (unidentified) from Dr. Traub in 1961, originally collected in Minas Gerais, Brasil, is very intriguing. It has beautiful blue-green foliage and is quite winter dormant. It has grown quite satisfactorily here and winters well in the ground.

Two other unidentified species are from Brasil. One labeled "?aulica" is quite different from my first species of this name. It has grown rapidly and should flower by 1964. The second was collected in the Campos do Jordao (Serre da Mantiqueira, alt. 1000 m.) is said to be deep red. The plant somewhat resembles *A. calyptrata* but is a much better grower and does not go dormant. It seems to have many more leaves at a time than most *Amaryllis.* I am hoping for flowers next season as it is quite large. Perhaps I will have to wait until 1964.

*Amaryllis reticulata* var. *striatifolia* has been grown in Australia for many years. I have only flowered it once (autumn 1960) and a plant of *A.* x *johnsonii* was in flower at the same time. Now seedlings of this cross with a reduced white stripe in their leaves are large enough to flower but have not as yet done so. From the same flowering I also got a few seedlings from selfing var. *striatifolia.*

*Amaryllis moreliana,* seeds from the U. S. A. recently received, has germinated well. The seedlings are growing vigorously.

I have a couple of other unidentified species from Brasil, but until they flower I cannot report on them.

*Amaryllis immaculata* was imported as a mature bulb and has made good foliage this year and has now gone dormant.

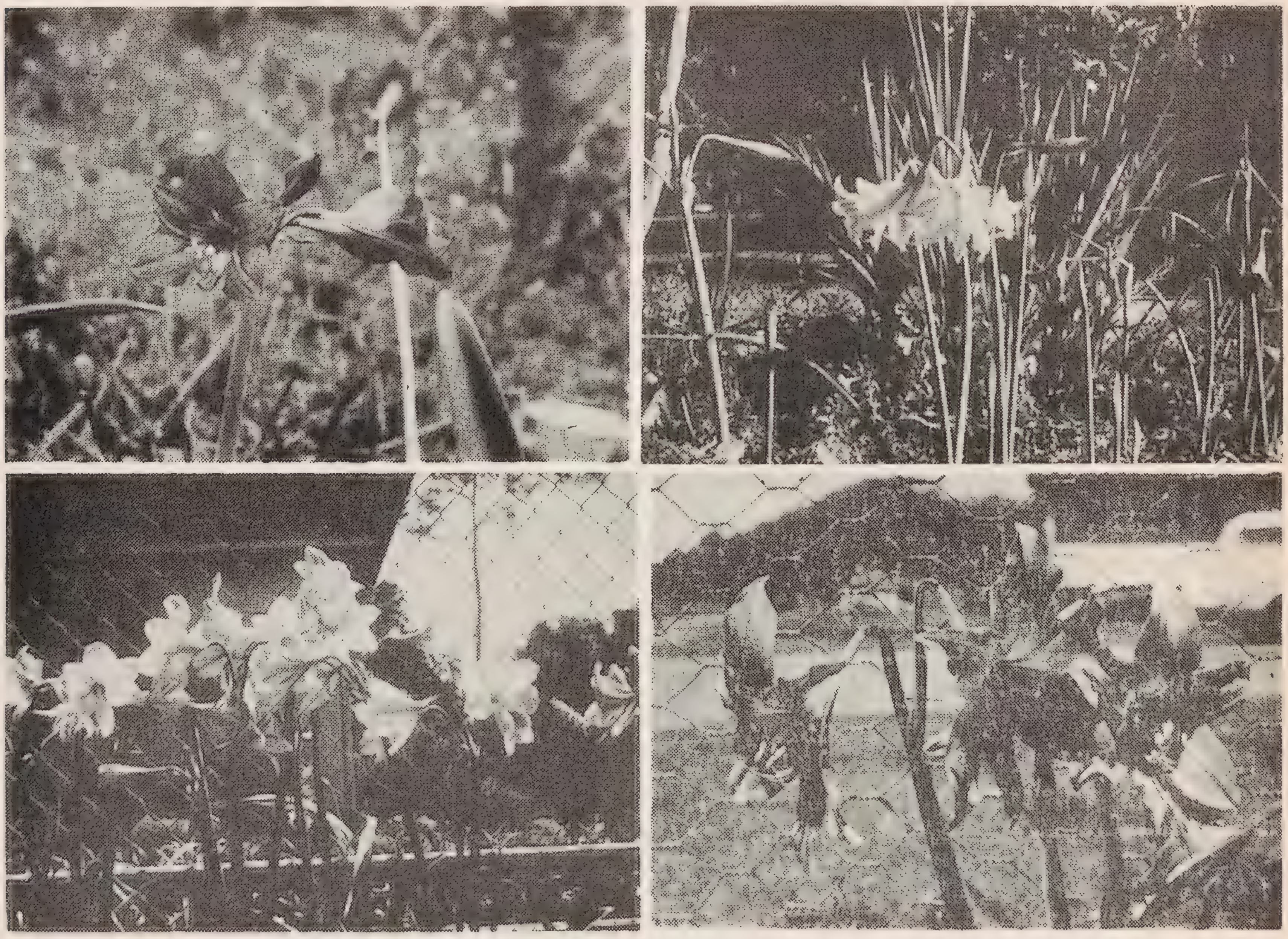

Fig. 21. *Amaryllis* collected by William Morris in northern Queensland gardens. Upper left, beautiful small red form, umbels 5-fld, greenish-white star in throat, and regular, wide-open perigone. Upper right, *Amaryllis vittata* (?), see text. Lower left, small, almost white form, resembles the form shown in upper left in shape. Lower right, apparently *Amaryllis belladonna* var. *major,* a beautiful scarlet (orange red), speckled with gold dust, and with a yellowish throat.

*Amaryllis ambigua,* also imported as a mature bulb, has grown well and is now dormant.

*Amaryllis elegans* (syn. *A. solandriflora*) from Caracas, Venezuela. Seeds germinated well and seedlings are growing vigorously, and so far has not gone dormant in winter.

It now remains to mention some of the bulbs which I collected in northern Queensland in October 1962.

The first appears to be *Amaryllis belladonna* L. var. *major* (see Fig. 21). It is a beautiful scarlet (orange red), speckled with gold dust, and with a yellowish throat. This was not uncommon in the gardens from Townsville to Cairns. However, the most common *Amaryllis* was a beautiful small red form (3½″ across) with about 5 flowers per umbel (see Fig. 21). It has a clear greenish-white star in the throat, and a regular, wide open perigone. It is unlike any other *Amaryllis* I have seen.

The one that thrilled me most may be a small form of *Amaryllis vittata* (see Fig. 21). It has a very long tepaltube, about 6″ long, flaring at the apex to about 3″ across. It has semi-pendulous flowers about 4 to each umbel. From a distance, the effect is a pale pink trumpet but from close up it is white with a few reddish lines on the tepalsegs.

In Innisfail, I saw a garden full of a beautiful, small, almost white *Amaryllis*. In shape it resembles the red one mentioned earlier, but is white with only a few fine reddish lines on it. Again it is only about 3½″ across the face. (See Fig. 21).

The last of these old and established bulbs was found in Gympie. To me it looked like an almost white variety of *A.* x *johnsonii.* It had somewhat more marked red lines on it than the others, but still gave the appearance of an almost white flower—about 4″ across the face. I obtained bulbs of all of these except the one at Innisfail, but I hope to get bulbs of it also this year.

Early hybrid? I sent Dr. Traub a bulb of this unidentified hybrid (?) which is very widespread in Australia. He has flowered it and believes that it is an early hybrid with *Amaryllis striata* in its parentage. The other parentage is of course unknown. In occasional gardens it is to be seen in profusion. It rather resembles *A. striata* but has a pale orange-pink flower on a scape up to 3 ft. tall, and has up to 8 flowers to the umbel. It has been consistently sterile here and no results have been obtained with its pollen on other *Amaryllis.*

Within the last month or two some interesting bulbs have been released from quarantine to me. These include 3 clones of *A.* Senorita Hybrids, *A. forgetii, A.* x *mostertii,* and a small bulb of *A. evansiae* x *A. aglaiae.* I will be awaiting results with these with great interest.

On top of these species, I have about twenty primary hybrids involving 8 different species. I will not bother listing and discussing these as not much can be predicted about them and I must wait their flowering. Most of them are very vigorous and I hope it will not be too many years until they flower. I have high hopes that from this genetic pool a nice selection of types of hybrids can be obtained. Perhaps in a few years I can give you some progress reports.

Our climate here seems very favorable for growing *Amaryllis*—species and hybrids—in the open ground. Rainfall is adequate although sometimes erratic and our water supply seems to be close enough to neutral and soft enough so that they grow well. Absence of extreme heat or cold means that most bulbs have a long growing season and as I mentioned earlier seedlings often grow the whole year round, winter only slowing their growth but not defoliating them.

As there are still quite a few species I would like to have, I would be pleased to hear from any other growers who would like to exchange bulbs or seeds.

[Editorial note.—With further reference to the unidentified hybrid *Amaryllis* with an umbel of 7 flowers, Fig. 16, Plant Life 1950 (pp. 99—100) should be noted. Here a similar hybrid is illustrated. It was grown by a friend of the late Major Pam in England in 1941. Major Pam also wrote to the writer about this hybrid and indicated that it was an old one dating back to the first half of the 19th century. Such a hybrid could have been carried from England to Australia by immigrants in the 19th century.—*Hamilton P. Traub*]

## FLOWERING AMARYLLIS EVANSIAE

BURR CLOUETTE, *California*

Last October (1962), I received three small seedling bulbs of *Amaryllis evansiae* from Claude Davis in exchange for *Amaryllis calyptrata* seedlings. The largest of these flowered on Sept. 10, 1963 (see Fig. 22).

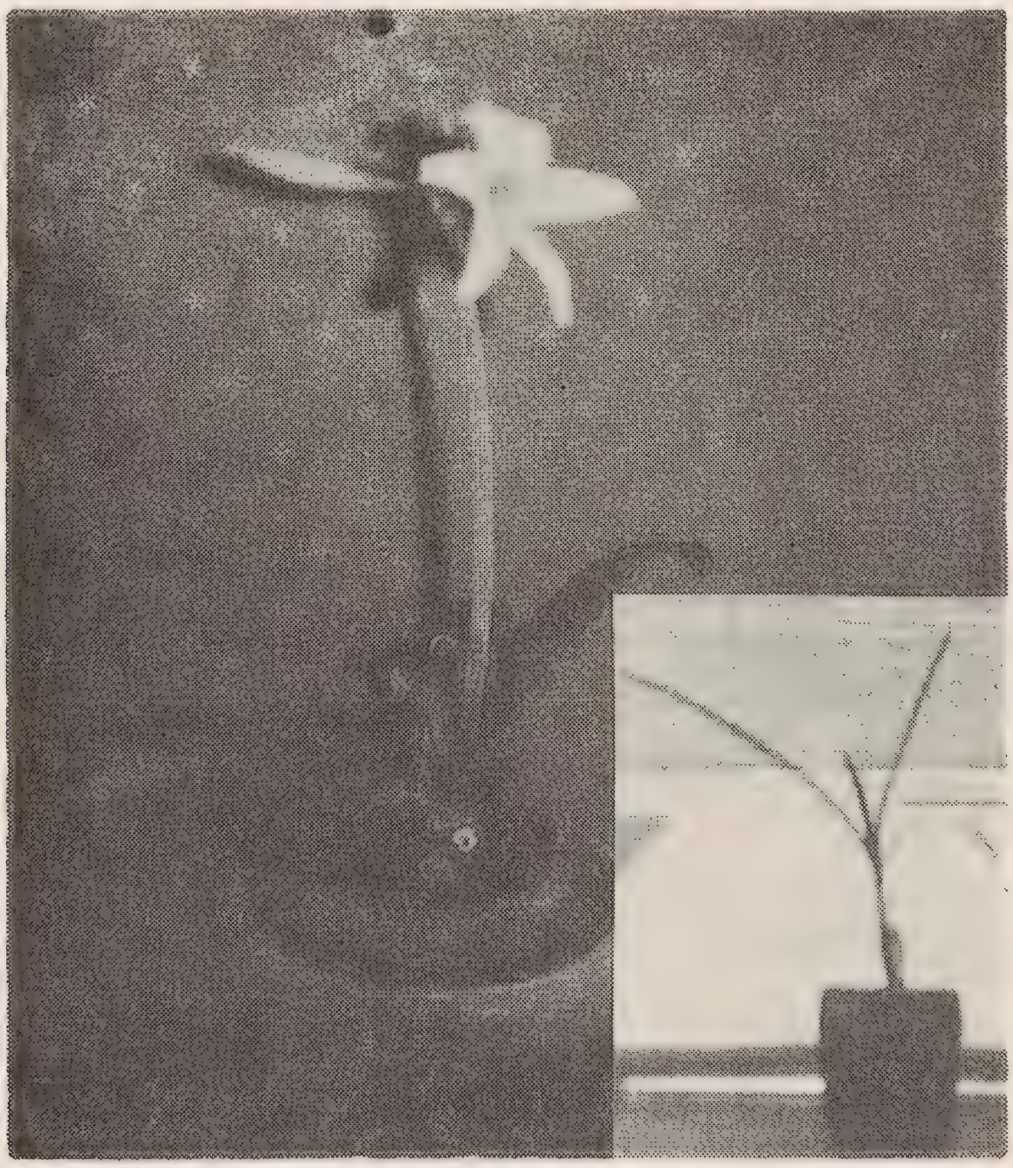

Fig. 22. Left, *Amaryllis evansiae* forma *flavescens* as flowered by Burr Clouette at San Diego, Calif. Right, seedling of *Worsleya rayneri.*

At the time of flowering, this bulb was about 1⅜ inches in diameter, growing in a 4″ clay pot, and planted in Black Magic planter mix. The three bulbs had spent the winter under Gro-Lux lights in the house in small pots. About the first of May, I repotted all three, the largest about 1″ in diameter, was planted in a shallow 4″ pot, with bulb about 1/3 above the soil. The other two smaller ones were both planted in one 4″ pot.

The largest bulb was put outside in full sun in front of the south-facing wall. The other two were returned to the south window in the house.

The bud was first noted on August 25th, and developed rapidly to open its first flower on Sept. 10. Just prior to opening, the two flower buds were 2 inches long, a brilliant yellowish-green Munsell hue 2.5G Y9/8. On opening, the flower was brilliant greenish yellow (7.5 Y9/8) with darker throat (2.5G Y8/9). The tips of the tepalsegs soon became flushed with a light pinkish orange. As the flower aged, this color spread towards the center of the flower, but only about two-thirds of the way, and the mid-stripe of the tepalsegs remained clear greenish-yellow. A very lovely and dainty flower!

The scape was 10 inches tall and carried two florets both open at the same time, and nearly at right angles to each other. The flowers were two inches deep and three inches across. The tepalsegs were somewhat wavy along the edges and reflexed at the tips.

I used some pollen saved from *Amaryllis* ''Gracilis Hybrids'' and another miniature on one bloom and pollen of 'Winter Carnival', 'Picotee' and a white Peruvian species on the other. The only *Amaryllis* I had in bloom was a white-striped red and *evansiae* was crossed on it.

One of the Senorita Hybrids is about to bloom so I will try some of the *evansiae* pollen on it. This is a back cross and should produce miniature pastels; maybe even yellowish ones.

## GROWING AMARYLLIS IN POTS

C. J. Crochet and Mrs. J. S. Barry, *Rt. 1, Prairieville, Louisiana*

Perhaps one of the most challenging aspects of *Amaryllis* growing is successful pot culture. For a number of years these writers have made an endeavor to successfully bloom *Amaryllis* year after year by keeping the bulbs potted.

First, the proper kind of potting soil must be considered. Various kinds of potting soils must be tried before it can be determined that only one is superior to all others for any particular area. In a score of years we have found through trial and error that: (1) the potting medium must be basically organic in nature (2) that the proper pot size must be considered for each bulb (3) that fertilization must take place regularly during the growing season and (4) that the moisture content must be kept constant.

Potting soil formulae vary. We have concluded that for south Louisiana the mixture components best suited for potted bulbs are 2 parts leaf mold, 2 parts rotted cow dung, and 1½ parts coarse (builder's grade) sand to which a heaping tablespoonful bone meal has been added. This mixture is thoroughly blended at potting time and the bulb is planted so that half will protrude from the surface of the potting mixture. The mixture level is kept one inch from the top of the pot by tapping the pot downward. This leaves space for watering.

Pot size is determined by the size of the bulb which it will hold. One inch from bulb to pot side is considered best. Red clay pots are used. Using too large a pot is not advisable because many named *Amaryllis* clones by nature have weak, small root systems which never penetrate to the bottom of the pot and therefore leave the bulb loose in the pot. Cases in point are several white flowered sorts which have thin and short root systems. Some are 'White Giant', 'Maria Goretti', and 'Albino.' Generally, white flowered amaryllis require shallow pots.

Fertilizer requirements are more than that needed for bed grown *Amaryllis*. Frequent fertilization is a prime consideration. A long lasting fertilizer is applied each month during the growing season. One-half teaspoonful "Fertiloam" is sprinkled dry around the inside rim of each pot and watered in. In addition, a diluted application of "Ra-Pid-Gro" is sprinkled on the leaf surfaces at two week intervals by using a watering can. We in the south are fortunate in that we can take our potted *Amaryllis* out of the greenhouse during the season of rapid leaf growth. We have had very favorable results with growing *Amaryllis* in part shade under trees. Pots are placed close together and sugar cane waste is packed around the pots up to the rim.

The sugar cane waste serves two purposes. One is that the potting mixture surface is kept cool during the hot summer months and more important is that the moisture content is kept constant so that periods of over watering and others of drying out are kept at a minimum.

At the end of the growing season, potted bulbs are returned to the greenhouse for the cold months.

The ultimate in pot growing has not been reached, but it is only through ceaseless experimentation that better procedures are learned, and it is only with these improvements that proximity toward perfection in flowering potted *Amaryllis* can be achieved.

## GROWING AMARYLLIDS IN NORTH GEORGIA

BECKWITH D. SMITH, *3479 Rockhaven Circle, N. E. Atlanta 24, Georgia*

My best *Amaryllis* are kept growing in the greenhouse all year. By handling them so, it is my belief they suffer less from wind and weather damage, traffic and from insects. Foliage growth is much better and leaves sometimes exceed thirty-six inches. Humidity is better balanced for growing, and proper watering and feeding can be almost perfectly controlled. A light shading of cloth over the greenhouse roof gives proper diffusion of the sun's rays and prevents sunspot, scald and burning of the leaves.

In the fall of 1962 I received a shipment of A. C. Buller hybrid *Amaryllis* from Cape Town, South Africa, which had been shipped by ocean vessel under refrigeration, and on receipt they were again placed under refrigeration at between forty and forty-five degrees until I could arrange to pot and place them in the greenhouse. After refrigeration for a week, the bulbs were potted, labeled as to color grouping and placed in the greenhouse under an average temperature of 70 degrees. Most of these bulbs were very anxious to bloom. In fact, many of them were showing bud tips on receipt, and they continued to grow, slowly, even under the cold conditions of storage. Some of the bulbs began to flower in four weeks, but some of them took a little longer, and flowered in six weeks. This period of bloom was in October, and I was

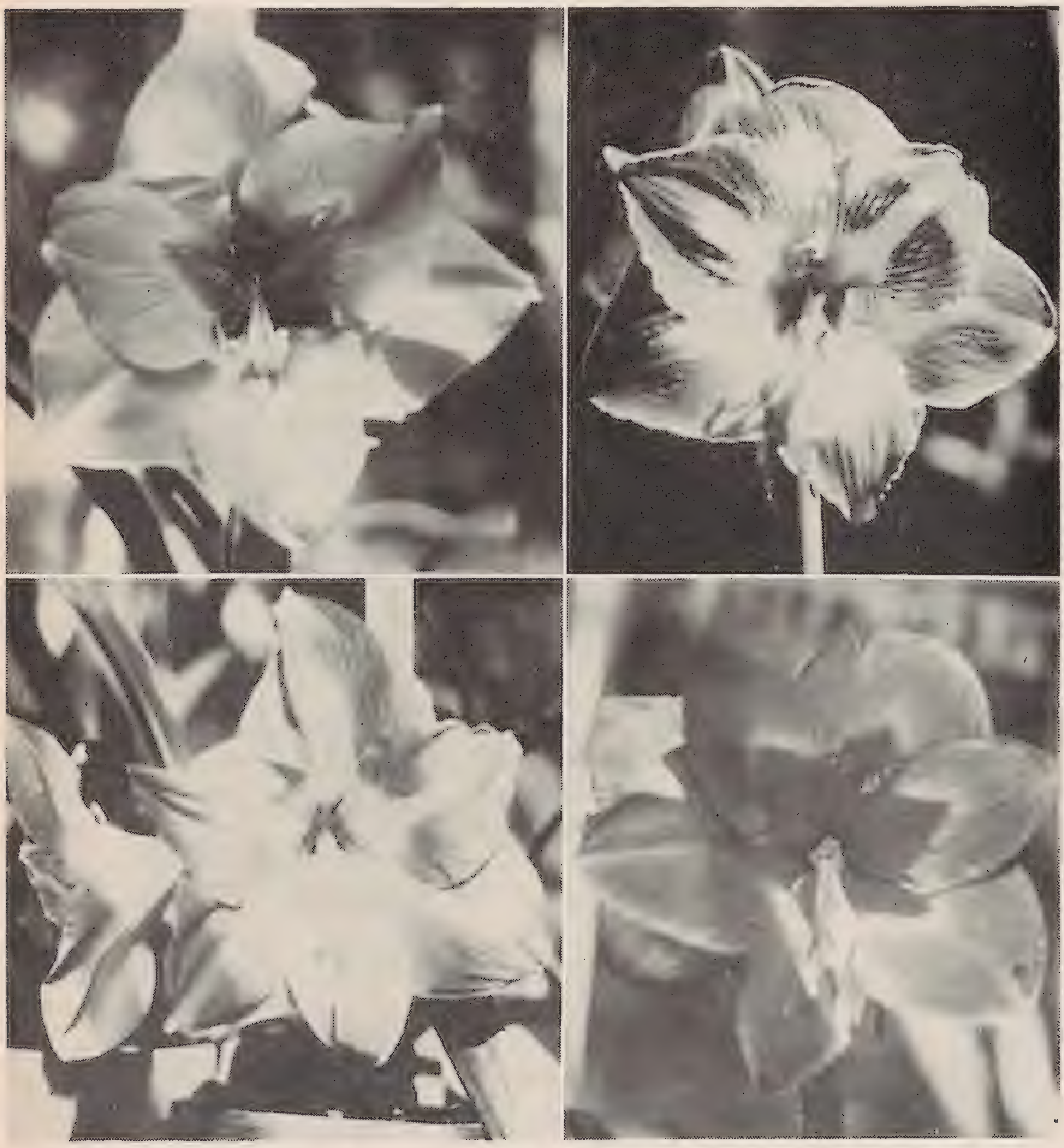

Fig. 23. Clones from the late A. C. Buller's Hybrid *Amaryllis;* bloomed April, 1963 by Beckwith D. Smith of Atlanta, Georgia. Upper left, color—orange red; upper right, color—watermelon red, suffused white, lower left, color—fuchsia pink, with white star; and lower right, color—wine red. Photos by Beckwith D. Smith.

informed that the bulbs had been dug at the Cape, South Africa, in July, just prior to their normal blooming season, approximately August and September. The blooming season for *Amaryllis* in South Africa is the reverse of our blooming season in the southern United States.

The bulbs produced flowers of entirely different colors and combinations of color than are available from the Holland growers. Some are self (solid colors) in shades of very dark red, scarlet, wine, salmon, rose pink, white, striped, and a new combination of color that can only be described as ''suffused''; that is, the basic color is rose, let us say, and throughout the bloom there is a suffusion of a lighter color, and with numerous ones showing a white blush. These flowers equally match and in my opinion, exceed the standards of European *Amaryllis.* My observation is, also, that the Buller *Amaryllis* have many other advantages, one of which is the heavy substance of the tepalsegs, making for a longer bloom period, certainly most desirable. Mr. Buller concentrated on this one feature, and he succeeded in developing superior hybrids without sacrificing any part of the beauty of his hybrid flowers. As each flower opened I tried to get good color pictures, and I have submitted these to Dr. Traub. (See Fig. 23.) Pollination was expected through several crosses of these October blooms, and seedlings are now in vigorous growth.

Similarly, in February of 1963, I potted up an additional selection of A. C. Buller bulbs for bloom and exhibition in the Atlanta Flower Show, held in conjunction with the Annual Convention of Federated Garden Clubs of the United States at Lenox Square, Atlanta, Georgia, on April 17-18, 1963, and at which time twenty-three potted Buller bulbs in bloom were exhibited for the first time in the United States. Delegates to the show numbered more than two thousand, from all parts of the United States, and all who saw the blooms were extravagant in their praise. Many of the ladies said that the *Amaryllis* exhibit was the focal part of the show.

After the close of the educational exhibit of Buller bulbs, the potted plants were brought back to my greenhouse and have continued to grow without let-up, and at the time this report is written (September 8, 1963), show no indication of losing their leaves or in any respect becoming deciduous. Apparently, this means that the Buller bulbs can be made to rapidly change their bloom habit, and become acclimatized for spring blooming normal in our southern states. On the other hand, if they are dug here (after being planted in outside ground space), possibly they could be brought into bloom during our fall season by digging and drying them in July, refrigerating for a short period to induce dormancy, and then potting up for indoor fall blooming. I believe it is worth a try, and I will follow this line of experimentation during the coming months. I would be very glad to have correspondence with any members of our Society as to their successes in growing the beautiful A. C. Buller hybrid *Amaryllis.*

# WINTERING AMARYLLIS IN THE NEW ORLEANS AREA

W. J. Perrin, *4753 Press Drive, New Orleans 26, Louisiana*

This is a follow-up article on *"Wintering Amaryllis in the New Orleans Area"*, appearing in 1963 Amaryllis Year Book, page 110. Our 1962-63 winter did not have the low temperature experienced in January

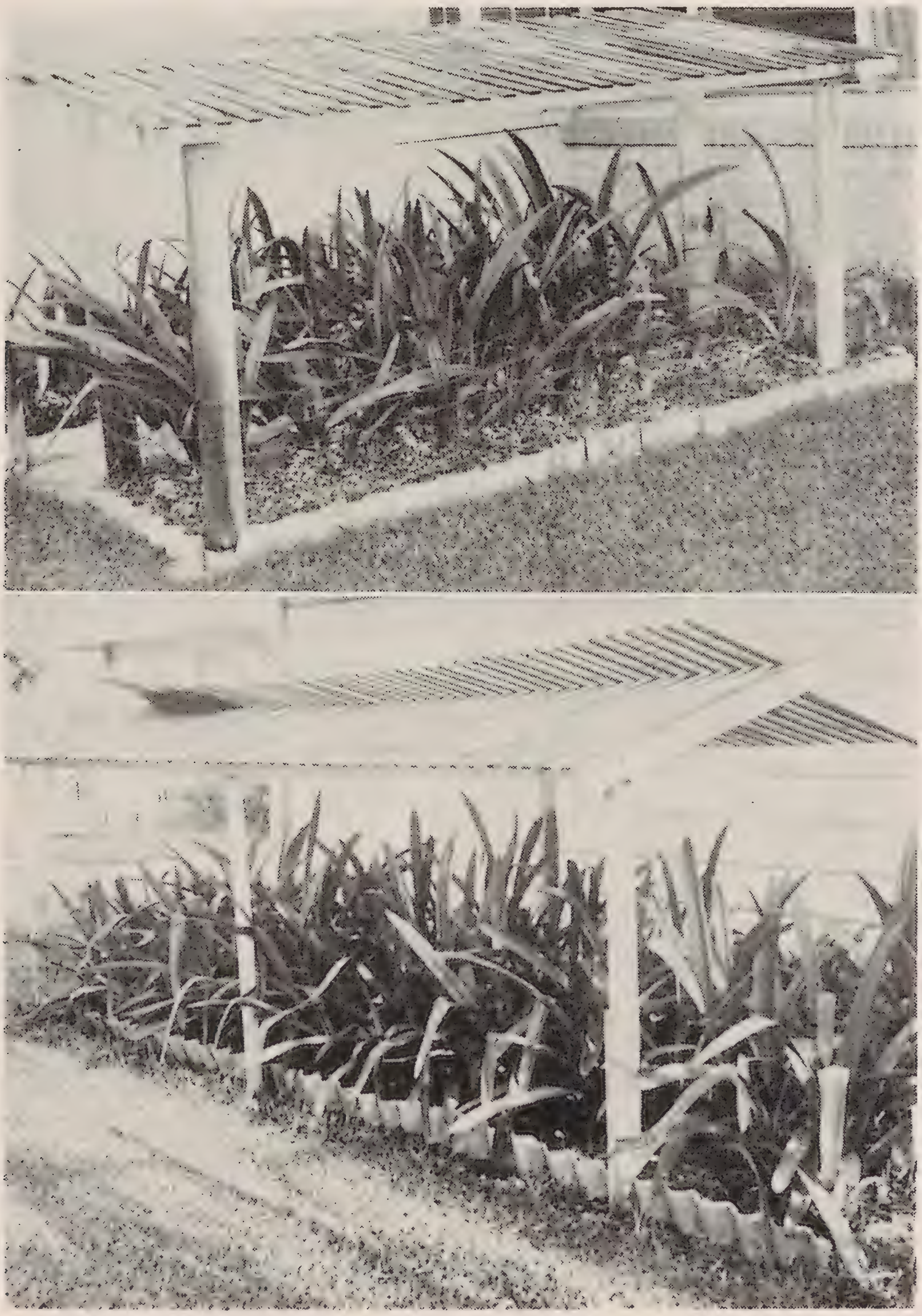

Fig. 24. Perrin hybrid Amaryllis (upper and lower) during summer of 1963 outdoors, New Orleans, La. These bulbs had been stored indoors during the previous winter. Photos by W. J. Perrin.

of 1962; however it did have a record number of freezes. In other words, the severity was lower and the frequency was higher. All during these some 12 to 15 freezes the writer had no worries about the effects of the weather on his bulbs. As mentioned in the '63 article, all of my bulbs were dug on November 1st, disinfected and placed in boxes well packed with Perlite. During the winter months the beds were dug and given a 1-inch layer of 5-10-5 commercial fertilizer and covered with an approximate 3 inch layer of the same soil. During the latter part of February the beds were again dug (spaded) and on March 1st the bulbs were planted. The four months rest given the bulbs seemed to do them much good, in that they took off and grew vigorously immediately. Bloom as expected, was a bit late and normal. This procedure is highly recommended as the rest does the bulbs good and above all, it eliminates worry of loss of bulbs by freeze. Two important facts must be remembered:

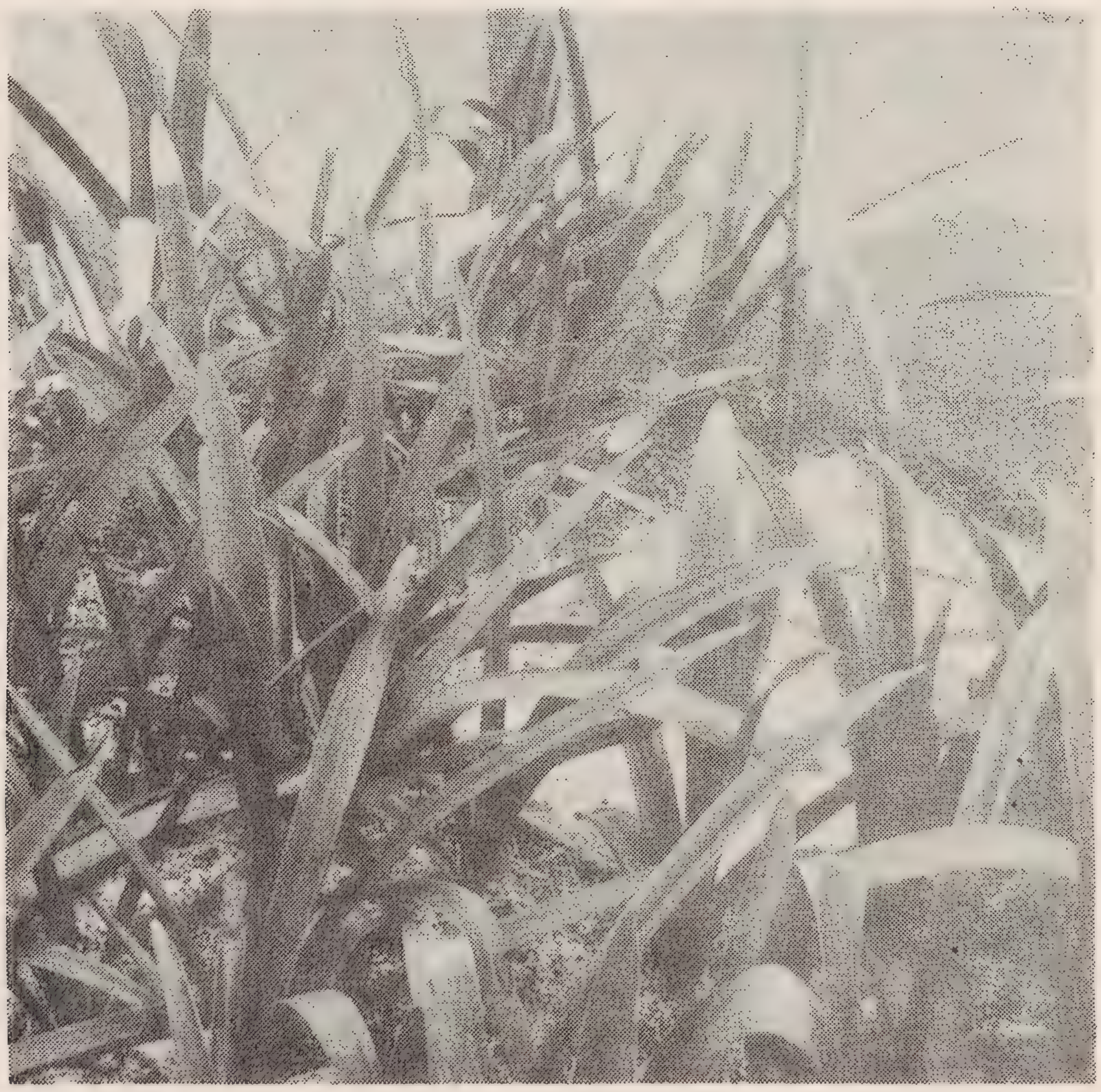

Fig. 25. Amaryllis 'Grand Mist' and 'Grand Bay' during summer of 1963 outdoors, New Orleans, La. These bulbs had been stored indoors during the previous winter. Photo by W. J. Perrin.

1. After packing and storing the bulbs, don't forget to place the boxes in a location free from freezing temperatures; 35 to 50 degree temperature range is satisfactory.
2. Amaryllis bulbs, when purchased or dug, should be soaked in a fungicide solution for 20 minutes and let drain before storing or planting. ORTHOCIDE FUNGICIDE containing 50% captan, works very well.

Please note Fig. 24. Here we see bulbs as of August 20th, 1963 during summer growth. These bulbs were all stored during winter months and are progressing normally as of this date. Of interest is Fig. 25. Here we see the two named and registered bulbs, 'Grand Mist' and 'Grand Bay' during the growing season. In all there are about 47 plants. This is especially interesting to the hobbiest for here we experience multiplication of one's own product.

## COMMENTS ON HYBRID AMARYLLIS

Burr Clouette, *California*

The clone 'La Forest Morton' bloomed well and was very beautiful—two scapes, each with four flowers. A white, unnamed clone, from Cecil Houdyshel blooms every now and then—four times last year; three times so far in 1963. It has three nice slightly greenish white flowers per scape. The flowers are about 7-inches across the face, and fairly flat. This bulb is grown outdoors in a pot, and bloomed at Christmas time last year. At that Season of the year in 1962, I had this white, a prepared 'Camellia' and 'Giant Goliath' in bloom, and three Hadece bulbs in bud and showng color. They were all in bloom by New Years.

'Winter Carnival' and 'Marion', two new whites, performed well—the latter has some fine reddish pencilings in the throat.

'Red Master' produced three scapes, each with two huge dark red flowers. 'Royal Velvet', with flowers not quite as large, produced three and four flowers on two separate scapes. The bulb was much smaller, only about two inches in diameter, whereas the bulb of 'Red Master' was over three inches in diameter.

Late in the season, a clone I have been growing under the name, 'Orange Queen' produced two four-flowered scapes, with florets 8-inches across the face, flat, orange with darker throat.

'Clown' is a good red and white striped clone, and was the last to bloom in the regular spring season.

One of Mrs. Barry's *A.* x *johnsonii* x 'Ludwigs Goliath' is a very nice medium red—four flowers, about 7-inches diameter, on each of two scapes.

One of my own seedlings (Mead Reginae Division x Dutch) is now producing its third scape. It is slightly brownish-medium red; 3 or 4 six-inch flowers per scape, and quite trumpet-shaped.

As I write this report (August 15, 1963), 'Camellia' which bloomed at Christmas time is producing a second scape; as is also 'Tangerine', a fine Hadeco clone which produced two scapes last New Years. The Hadeco clone 'Rosaline' has just produced its third scape.

I was disappointed in the clone 'Pallas' which was substituted for 'Volendan'. It bloomed well, 4-upturned, medium sized flowers on each of two scapes, but was just an orange red with white throat. I do not like the upturned flowers.

# THE FASCINATING ZEPHYRANTHEAE

Alek Korsakoff, *2975 Shipping Avenue, Miami, Florida 33133*

All my life I have loved plants and their flowers. My happiest hours were spent in parks, botanical gardens (plantariums), woods, fields and forests. Recently my interest has shifted to the really miniature things that can be grown in small pots.

Since 1957, when Mrs. Clint sent me a goodly collection of *Zephyrantheae,* I have been enamored with the Rain Lilies—or Zephyr Lilies, or Fairy Lilies. I am captivated by the diversity of flower form, from tubular to rather flattish when fully open. Colors range from purest white, shading through pinks and rose into dark red; all shades of yellow, ranging into shades of orange, and to cardinal red; pastels in various shades; some bicolors, and even tricolors; some with white, green or burgundy red throats. Sizes of the flowers range from one-inch to five inches across the face when fully open, and with tepalsegs ⅛-inch to more than one inch in width.

What a difference there is in foliage! Starting from almost hair-line strings (filiform), the leaves range to 1-inch or slightly more in width; in length they range from a few inches to 18 or 20 inches or more in length; with coloring ranging from the dullest grayish to the brightest varnished yellowish or dark greens.

In hybridizing one is fascinated by the great uncertainty of the results. One finds that some are self-sterile and unresponsive to the pollen from other species. Others cross and ripen seeds that never germinate. Many, far too many, cross and produce seeds so profusely, but the seedlings are replicas of the mother plant. Thus apomixis is so prevalent that one never knows what one should get from a particular crossing.

When one gets a real hybrid, one is cheered with the thought that he has proven compatibility of two species, or genera, knowledge useful to science in general. During the six years that I have been working with the *Zephyrantheae,* only one cross yielded a hybrid that merited naming in my opinion.

Discouraging? Oh no! When one sees dozens of bright faces smiling at him, swaying and dancing in the breeze—almost after every good shower—one smiles too. Give them up? Oh no! There is so much to do; so much to hope for; and such a good chance of producing something that will surely bring joy to many others. There is no chance whatever of giving up such a fascinating interest in life.

During the next few weeks every day I will be expecting the promised bulbs from the Dominican Republic—*Zephyranthes bifolia* Aublet—right from its home where it was first found in the year 1775. I am staying put!

# EVOLUTION OF AN AMARYLLIS ENTHUSIAST

MRS. JOHN A. ETHERIDGE, *Florida*

Whoever thought twenty years ago when we bought our Florida home that the large bed of *Amaryllis* on the grounds would spark a hobby that has finally grown into a full-time occupation for two people! At the time, we were mostly impressed by the size of the property (two city lots 100 by 105 feet) and by the lovely oaks, citrus, hibiscus and other semi-tropical shrubs and vines. We arrived in the spring, however, the best blooming time for *Amaryllis,* and, after seeing these beautiful plants in bloom, we could hardly wait until the next spring to see them again.

As the years went by, I joined one of the garden circles and became interested in the flower shows. Some time later, the Federation Flower Show was held at a time when *Amaryllis* were at their best. I took First, Second, and Third in that show and, from then on, I was an enthusiastic grower of *Amaryllis.*

A kindly neighbor showed me how to plant the seed with the point down, making little grooves with a ruler or yardstick, depending on the size of container used. By 1957, with the help of a yard man, I had extended my collection to blooming-size 3,500 Mead hybrid bulbs. In those early days, no record was kept of the crosses; just waited for the surprises, which were very rewarding. Among the most outstanding color shades in the crosses were fuschia shades, some with light throats—others solid, and one plum shade, the most perfect *Amaryllis* I have ever seen! Out came the pollination booth and I waited for the second scape to appear. Heartbreak followed as it barely came through and then withered. I began soil testing and found the soil very acid. I had been advised over the years to use neutral copper and had used it so long that the ground had become toxic. Many of my special bulbs disappeared.

Space had run out in our garden but the desire for some Dutch *Amaryllis* plagued me. I thought I would get just a few, though where I would put them was a big problem. About this time, my husband joined me in my hobby as he was greatly impressed with them. Soon there were several hundred Dutch hybrids on hand so we farmed out most of the Mead hybrids to a daughter and a friend. Now we have on hand at all times about 3,500 of the Dutch hybrids and crosses. Where could we put all of these? It was then that my husband had a brain storm. Stooping, kneeling, and bending to keep weeds and wild grass out of the *Amaryllis* caused my husband to wonder if there wasn't a better way to care for the plants. We had not yet learned about mulching. It seemed that if some way could be found to *raise* the beds to a no-stooping level, care would be much easier. Why not tables? Acting on this impulse, my husband built two tables as an experiment. The tables were 28 inches high with 1″ by 6″ treated lumber for the frames and hardware cloth for the bottoms. The tables were very successful, easing the strain on back and knees. The next year we built ten more tables. The tables were placed in a single row and a shade shelter was constructed of 6 foot poultry wire covered with Spanish Moss. The moss gives filtered shade.

We now have about forty tables, 2′ by 4′ in size. About the only change we have made is to use 1″ by 8″ boards instead of the 1″ by 6″, thus giving greater depth to the bed. With full-sized, mature bulbs we plant 18 to each table, with three rows, six bulbs to the row. Smaller size bulbs can be planted more closely. Fertilizing, spraying and mulching are easier. We have also, most of the time, 100 or more potted plants. These are also placed in the tables and spaces between the pots are packed with mulch to conserve moisture.

The table method gives us the opportunity to use a uniform soil mix and to watch closely the pH. We have found that *Amaryllis* do their best when the pH is about 6¾. Less than 6½ may cause acid decline. For our soil mix, we use ¼ garden soil, ¼ compost, ¼ well-rotted manure and ¼ sand or Perlite for aeration, plus bonemeal. This mixture has worked very successfully.

Some of our Texas friends claim that our table method is a lazy man's way to grow *Amaryllis,* but my! what a relief not to have to do all that stooping. There is still plenty of work to do. Besides keeping a check on the soil and spraying regularly, we have to watch for insects. About the only insects that bother *Amaryllis* are the lubbar grasshopper, which is controlled by spraying or by using a pair of clippers to snip the villain in two; slugs and snails, which are controlled by bait.

In spite of our table method, we still keep four ground beds in which we have McCann doubles, whites doubles, whites with a faint line of pink, some old Mead favorites and Seminole Reds. We use commercial fertilizers which are high in phosphorus and potash, low in nitrogen, with minor elements. Seedlings are given liquid fertilizer and all sizes are given some as during the rainy summer season so much is leached out.

Each year we import bulbs from the best growers in Holland and advertise them nationally in three magazines. From the small beginning with one bed of Meads, we have come to the place where we live and breath *Amaryllis* all year long.—*6908 Narin Ave., Tampa, Florida, 33604.*

## EFFECT OF DECEMBER 1962 FREEZE ON FLORIDA AMARYLLIS

MRS. FRED TEBBEN, *P. O. Box 281, Lake Hamilton, Florida*

In the 1963 Amaryllis Year Book, I reported on my Amaryllis moved from Illinois to Florida in 1961. This article was to be a report on the progress made in growth of all bulbs here in my Florida garden, but the worst freeze of the century came to Florida in December, 1962, so my report will really be on its effect on all amaryllis here. For three days and nights we had such extremely low temperatures it was feared little would be left growing. Here the thermometer registered 18 degrees for long periods of time, and even much lower in the low sections outside town. We are on one of the highest spots in Central Florida and so were fortunate. Then, too, the cold came from the northwest and had to pass over much warm land area to reach us so we did not suffer as much damage as had been feared at first. Almost all signs of that severe freeze are now gone, altho much tropical planting has had to be replaced with hardier material.

I have two large Amaryllis beds, each partially shaded and each partially protected from the north winds. In one bed are all my Dutch bulbs and African ones, while in the other are my seedling bulbs and those from India and Japan. I watched these most anxiously for I had nothing with which to cover or mulch either bed, and I was much surprised to find that very little of the Amaryllis foliage suffered much damage. Some of the Dutch bulb foliage immediately showed red spots as a result of the cold damage, but very little showed up on the seedling bed. The ''native'' *A. rutila fulgida* bulbs, however, lost all their leaves and as a result began to put up buds early in January. More cold came and as a result these buds either blighted or bloomed in very deformed and crooked shapes. The Dutch bulbs also sent up bud stalks early and many of these blighted, but some came later and were really lovely and much appreciated since I had feared I would lose all of them. Those that did best were protected from the extremely cold northwest wind, so I shall try to give more protection from such winds in the future. In the seedling bed which is more exposed no foliage was frozen and almost none showed red spots from the cold, but not a single bud appeared, and I now find that the bulbs are all showing offsets. In many cases there are now four bulbs where I planted only one, so I am afraid I shall again have little bloom from these bulbs.

The *Crinum* foliage was all frozen down entirely, and many people dug and discarded their bulbs because of this. I salvaged a few so now I shall have more to identify later. All have sent up fine foliage and *Crinum* 'Cecil Houdyshel' and the ''Milk and Wine'' lilies have bloomed very well; so has *Crinodonna corsii* clone 'Fred Howard.' It bloomed in April and is again showing bud stalks, so even tho all foliage was frozen, these have all come back beautifully and all will bloom eventually. *Habranthus* and *Zephyranthes* were beautiful as always, and the paper white narcissi and the daylilies have outdone themselves with bloom this year. So, all in all, little damage was done to the amaryllids grown here, and I hope we shall never again experience such a freeze in this section.

I have acquired a few more Amaryllis bulbs, of course. I have been much pleased with the beds of the Mead hybrids that bloom so beautifully over a long period here, and the variety of colors one finds among them. Then, too, I purchased some small 22/24 centimeter bulbs of the clones of the Dutch hybrids that seem to do best in the borders here in the south. Among these were 'Apple Blossom,' 'Love's Desire,' 'Ludwig Dazzler,' 'Marie Goretti,' 'Margaret Truman,' and others.

Even tho these were small bulbs all of them bloomed and all have grown enormously in the border. I was very pleased with these small sized bulbs and believe I shall add more of this size as time goes on.

We are told here that the *Amaryllis* need little but water to make them grow and bloom very well. Chemical fertilizers leach away quickly and do little good so I am adding humus in the form of compost etc., to hold the moisture and add food value. This year I seem not to have many of the huge lubber grasshoppers and only a few cutworms to fight, so I am making progress.

Before my last *Amaryllis* bud had opened, my husband and I took off on a two weeks' trip through the Smokies and on up to Washington, D. C. to visit our son. All the way up I enjoyed the Mead hybrids and native amaryllids blooming in Florida; and through Georgia and the Carolinas, the iris, daylilies and peonies were gorgeous. In the Smokies the dogwood was at its very best, and in Washington the azaleas and rhododendron were lovely. On our return trip we stopped in Charleston, South Carolina, for a few days and there I saw lovely beds of *Amaryllis* in bloom in mid-May. Many of these were the species bulbs, but most were the hardy Mead hybrids. I inquired about them, and was told that the temperature reached nine degrees there in Charleston, but the *Amaryllis* suffered no damage as they are planted deeply enough so that they do not come up until all danger of cold weather has passed.

All in all, I cannot complain of the season, and can only hope for more bloom another year. The blooming season seems to be somewhat more extended than one at first realized, as only last week I saw a lovely red *Amaryllis* in bloom on the north side of a house not far away. This may be unusual, but the crinums come when the *Amaryllis* are done, and the *Habranthus* are indeed ''surprise lilies'' and are still blooming now and then along the edge of the *Amaryllis* bed. I have many more seedlings to plant out this fall, so will have to extend my *Amaryllis* beds to take them in. To me a bulb is a ''surprise package,'' and I can never seem to have enough of them. They have bloomed this year from mid-February till mid-July and may go on longer but since I shall soon go back to Illinois for a visit I suppose I shall miss seeing them. Thus far I have made no crosses or tried any hybridization of my own. The seedlings I have to set out next fall are pure Dutch, or Dutch x Mead crosses made by other people.

## LANDSCAPING WITH AMARYLLIS

Mrs. Bob E. Herold, *203 Cromwell Dr., San Antonio, Texas 78228*

As most Texas gardeners begin *Amaryllis* growing with *A.* x *johnsonii;* I, too, began my interest with ramets of this clone. My garden was begun in earnest in June, 1949, with the building of a new home; however, I've gardened all over Texas for over thirty years. As my garden progressed, transplanting occurred in various beds for more pleasing harmony.

My next *Amaryllis* was a very prolific variety, and to date, I have not been able to identify it. It seems to be a reverse of *A.* x *johnsonii*—small, trumpet-shaped, white with rose-red stripes, fragrant, two to three scapes with four to six florets to the scape and a good multiplier. I have grown this for about twenty years, the ''start'' coming originally from California. I have exchanged and given it to many people trying to find out about it. Also, I have sent bulbs to Mrs. Cecil Houdyshel, California; Mr. Claude W. Davis, Louisiana and more recently to Mrs. A. C. Pichard of Houston. These are interplanted along a winding sidewalk bed which presents a profusion of color in early spring from bulbs, early perennials and bearded Iris.

Along a driveway, a bed of pink roses is planted each year with pink *Ranunculus,* shades of double pink St. Brigid anemones and pink tulips, interspersed with pink Rain Lilies and one hundred and eighty-five pink and white ''Califlora hybrid'' American unnamed *Amaryllis.* These were gained from an original purchase of one dozen mixed ''Califlora hybrids'' bought in 1952. This one *Amaryllis* has increased in such prolific numbers that I now have two hundred and twenty-five of this one color variety, besides what I have given away. In front of these *Amaryllis,* a border of the common pink oxalis add their beauty nine months of the year.

Across the front of the house, a brick planter has thirty of the pink and white striped ''Califlora hybrids'' and in the springtime has a row of ''White Magic'' petunias bordering these.

In front of the shrubbery planting are more *Amaryllis.* Heretofore, they have been mixed reds of the ''Califlora hybrids'', but these have been moved to a back garden bed and this spring will see a continuation of the small pink and white trumpets, already mentioned.

We have a corner lot and the street side has an attractive, old and ornate antique white-painted ornamental iron fence set in concrete, the concrete covered with various small leaved varieties of ivies. Inside this fence, is a choice new bed of Ludwig seedlings. From the one hundred seeds, I have sixty bulbs. I had the best luck with the dark reds, twenty-one out of twenty-five seeds; fifteen out of twenty-five in the crimson; fifteen out of twenty-five in the pinks, and only nine out of twenty-five in the whites. In this bed, are a number of choice ''selfs'' from unnamed Ludwig seedlings, before I knew anything about hybridizing. I also have three ''Picotee'' seedlings. This bed will be bordered with white ''Little Gem'' Sweet Alyssum. This bed will be watched to see what I have.

In back of a new garage are two new beds, one with one hundred and eleven ''Self'' seedlings of 'Nivalis' and 'Maria Goretti'. It has been bordered with the green and yellow *Alternanthera.* The other bed includes my choice named clones and other unnamed Ludwig and Warmerhoven bulbs. In this bed are 'Sweet Seventeen' and five offsets in three years; 'Bouquet' (my favorite), 'Halley', 'Maria Goretti', 'Nivalis', 'Ludwig's Scarlet', 'Doris Lilian', 'Pink Favorite', *Amaryllis striata,* var. *fulgida,* and *rutila,* as well as many unnamed American hybrids. This bed has been bordered with the red and yellow *Alternanthera.*

Across the lawn, the side and back cyclone fences are entirely covered with nine varieties of ivies, and here are many more American and Dutch seedlings and offsets, including one hundred and four of 'Bouquet' ''self'' seedlings. All of the back garden beds are in graceful curves edged with red bricks (at ground level) and ''monkey grass''. Although monkey grass can be a nuisance, with attention, it makes a neat appearing border in the cold of winter when gardening comes to a ''slow walk''.

Even my alley is landscaped with *Amaryllis,* about fifty; with a restful background of the ivy. In all, I have seven hundred and ten *Amaryllis* in blooming size with three hundred and fifty one-to-two year old seedlings to look forward to in enthusiastic anticipation. I grow many other amaryllids. This fall, I will purchase four named *Amaryllis* clones and several species.

Since I go for bulbs, people say they never pass without seeing color and beauty as well as a good general appearance; all of which is cared for by my husband and myself.

## THE 1962-63 AMARYLLIS SEASON

Robert D. Goedert, *P. O. Box 6534, Jacksonville 5, Florida*

The 1962-63 season like the two previous seasons was very cold. Many *Amaryllis* planted in the border in the south, possibly weakened by the past two seasons, rotted during the winter and were lost. A number of people complained that they lost their entire collection of Dutch *Amaryllis.* This was particularly evident in the Valdosta, Georgia area where few Dutch *Amaryllis* were entered at the show. The Mead hybrids in the Valdosta area appeared to have fared better. Whether this indicates that the Dutch hybrids are less hardy than the Mead hybrids is not fully evident. First there are many Mead hybrids planted in the yards that gets little or no care and if a bulb or so is lost no one particularly notices it. When a person has a few Dutch *Amaryllis* he gives them a great deal more attention. This includes additional fertilizer and it is the writer's opinion that the Dutch *Amaryllis* being given special care are more fleshy and not hardened off as they should be at the end of the season. This tends to cause many people to think the Dutch *Amaryllis* can not stand as much cold as the Mead hybrids. It has been my experience that the Dutch *Amaryllis,* if treated like the Mead hybrids, are possibly just as hardy. I do feel that those who grow their Dutch *Amaryllis* in the border need to give them a little more potash in the fall to harden them off before winter sets in. Planting in a well drained area will also help and some sort of mulch over them in winter would also be helpful.

Not only did those who planted in the border lose bulbs but many who planted in pots reported great losses. In most cases they attributed this to carelessness. Some said they had heard the weather forecast but just did not take it too seriously. You might say they figured lightning does not strike the same place three times. Many said they went out the next morning too late and found their bulbs completely frozen. Some placed their potted plants in their garages or other area only to find this did not provide adequate protection.

This all indicates that, in the future, bulbs in the border should be planted deeper, should be hardened off in the fall and given a little special protection. Those with potted plants will have to learn that they should provide a little heat in their storage areas during extremely cold weather.

The *Amaryllis* bulb crop from Holland and other areas was not as good in quality as normal this past season. Some of the white clones as well as picotee types showed that due possibly to a sudden dip in temperature the bulbs had made spikes in the greenhouse during late summer or fall. Some bulbs showed advance buds which decayed during shipment. This reduced the number of spikes some clones produced. The Hadeco South African clones, on the other hand, produced an exceptional number with three spikes. The South African *Amaryllis* are becoming more popular and with the introduction of named clones should be more evident at shows. The *Amaryllis* bulbs from India this past season also were not up to quality and many did not flower; however the quality of the flowers appears to improve each year. It is expected that the percentage of spikes from the Indian bulbs will be better in the future as they are beginning to rotate their crops to new ground each year. They also are trying to market the bulbs as soon as they reach maturity. They find that once a field reaches maturity the bulbs will decline if not lifted and planted in new soil.

This past season more people purchased the smaller size Dutch bulbs. Besides the fact that two of these can be purchased for the price of one large bulb many find they are much more successful with them. The young bulbs are usually more vigorous. They make a fair spike the first year and if fertilized properly will grow into a top size bulb for the second season. Many find the second year with a good root system established in a pot they can get an exhibition bloom much easier than with a newly imported large bulb. Of course there are still a number of experienced exhibitors who prefer to buy the large bulbs for exhibition. A really experienced grower can flower a large bulb very successfully the first year and keep the bulb in a flowering condition for many years. The inexperienced grower however finds the older bulbs harder to handle as they tend to remain dormant over longer periods whereas the young bulbs tend to start easier and establish themselves better. The small bulbs once established are easier to maintain. The small size bulbs are also becoming very popular in Italy and southern France as well as in the southern United States. Many northern hobbiests prefer the smaller bulbs. They are not as successful with the larger bulbs as they decline after flowering the first year. The small bulb will establish itself at the proper size for pot culture and can be maintained in a healthy condition that will make a reasonable flower spike or two each year without forcing. They feel that bulbs that are overgrown can not be maintained under pot culture conditions and have to decline. Those who grow for exhibition should understand that when a bulb is forced to get a maximum flower, most clones can not recover in one year's growth and they should not depend on exhibition spikes from the same bulbs year after year. They should have a program whereby they have new or young bulbs coming along each year.

While the large exhibition varieties in solid colors are still most popular there is some indication that other types will be seen more in the future. First in the large exhibition types there are trends away from the solid colors and the classic flat round leopoldi types. Ludwig's Picotee types have an airy form. They are a departure from the solid whites. Although for years there have been many white seedlings with a touch of red or pink in them. Few or none had been introduced. The past few seasons we have seen such clones as 'Marion', 'Peppermint', and 'Siren of Paradise' introduced. These are all beautiful white clones with just a fleck or pencil stripe of red. This gives them some individuality not associated with the pure whites. Ludwig's new introduction, 'Streaking Stripes', indicates a new departure in hybridizing. Here-to-fore a clone with any green in its makeup was considered inferior. 'Streaking Stripes' has a great deal of green in it. It is however an exceptionally nice clone. The blending of red and white with green is very pleasing. It also has a very elegant and beautiful loose form. It probably will become a leading clone although a striped variety seldom ever is as popular as a solid color. The new blush or blended clones such as 'Golden Triumphator', 'Floriade' and 'Pink Beauty' are becoming very popular. All this in the large flowering hybrids is a welcome change from the Dutch breeding of the past where some 8 or 10 solid color tones were all that were available and each new one was another in this limited color range.

In addition to the new bitones and blends being developed new colors are appearing. Ludwig's 'Home Decorator' is a new bronzy salmon that has wonderful color value. The Hadeco African *Amaryllis* also have many improved colors among them.

The small *Amaryllis* are each year becoming more popular with the housewife; however they are not widely accepted by the exhibitor. The gracilis forms can be grown several to a pot and give a show of flowers over a relatively long period of time. As these bulbs can be purchased more reasonably they will become popular and it is hoped their color range will be expanded. New types of free flowering medium size hybrids are needed in the trade. The large flowering hybrids do not flower reliably enough to get and keep the interest of the normal housewife. A free flowering small or medium flower variety is believed to be practical in breeding and once developed can become very popular with the housewife. In this respect it is hoped that some of the free flowering habits of *A. striata* and other species can be developed in new small or medium size hybrids.

The quality of flowers at the shows has declined the past several years. Part of this is a result of the extremely cold weather but part is due to the lack of interest by the exhibitors in purchasing new stock each year and retiring some older bulbs previously purchased that are declining.

Possibly the top show variety of the past season was 'Marion'. It grows large very easily and can compete successfully for the Best Flower in the show. In commenting on the clones I observed this past season I would like to again, as last season, comment by color groups.

## WHITE CLONES

This past season saw several new white clones introduced. 'Ouverture' and 'Winter Carnival' are both tall new whites with airy form. Both seem to be excellent additions to the whites. Of the older clones 'Flying Cloud', 'White Giant', 'Christmas Gift', 'Nivalis', 'White Crane' and 'Dazzler' all gave a good account of themselves. Many still claim first place for 'Oasis'. Others have their own white favorite. 'Mt. Blanc' possibly was the most outstanding in my collection. Most of these made three (3) large spikes.

## WHITE WITH COLOR

Picotee clones remain popular and the two new named clones, 'Square Dance' and 'Dutch Doll', were well received. The clone, 'Sensation', is just what the name implies. It is a real flat white with a ¾″ bright red border. It is without a doubt one of the most beautiful clones. 'Marion' is a huge white with some red penciling. It is a good show variety and will become very popular as it flowers easily.

## WHITE FLUSHED

'Apple Blossom' still is the most popular *Amaryllis* and a most vigorous clone. 'Love's Desire' with still more pink in it is very good. 'Rose Marie', a new Van Meeuwen clone is very similar to 'Love's Desire'. 'Pink Beauty', white flushed pink, is gaining in popularity. 'Little Diamond' is still the undisputed leader of the pinks. Any one who sees it wants it. It appears solid pink at a distance and is round and very flat. The flower is rather large. 'Floriade' and 'Golden Triumphator' make very large flowers. One is white blush pink and the other white blushed golden orange.

## WHITE STRIPED

'Streaking Stripes', Ludwig's new striped clone is very outstanding. It has a great deal of green in its makeup which adds handsomely to its beauty. It also has an exceptionally beautiful form. This is a striped clone I predict will become very popular. 'Zenith' still is popular with the exhibitors especially in Texas. 'Silver Lining' is popular in the Mobile area. Van Meeuwen's new variety, 'Pallas', is a white veined red clone rather than a stripe and is very interesting.

## BICOLOR

'Beacon' is still popular. 'Candy Cane' flowered well this past season. 'Fantasy' and 'Royal Dutch' are popular rose and white varieties. 'Five Star General' appears to have propagation troubles. Van Meeuwen's new clone, 'Aphrodite', is somewhat similar to 'Five Star

General' and a welcome new addition to the bright red and white clones. 'Piquant' is a fine new clone similar to 'Candy Cane' but of a medium dark red coloring rather than orange red, it is a fine new addition.

### BLENDS

Two new ones in this group were well received. 'Day Dream' is a fine new clone that might be classified as an improved 'Margaret Rose' or 'Sweet Seventeen'. Only time will tell. It is a fine clone with very large overlapping tepalsegs. 'Fair Lady', vermilion and white, with the make up as 'Margaret Rose' is a real beauty and really different. It is an excellent new one. 'Pinksterflower' is still popular in orange and white. 'Rosaline', a Hadeco clone, is brick rose and white. This is a new color and a most beautiful free flowering addition.

### ROSE PINK

'Dutch Belle', a soft light rose pink is probably the most outstanding introduction in this color in a number of years. The backs of the tepalsegs are white which makes the flower appear lighter. 'Flora Queen', although very scarce, is a real beauty in a light rose with lavender caste. 'Queen of Sheba' still remains one of the leading rose pinks with lavender caste. It grows easily. 'Bellini' is a new medium rose pink that was well received. 'Shakespeare' (not Ludwig's and to be renamed) is a particular old rose color that is very outstanding. 'Fritz Kreisler', a new one similar to 'Daintiness', drew a great deal of comment and will be popular this coming season.

### ROSE RED

'Bella Vista' is still possibly the best medium rose red. It is a real beauty and a very robust grower. 'Trixie', Ludwig's new rose red, is a good addition to this color. Warmenhoven's 'Mysterie', 'Moreno', and 'Bordeau' are all good dark rose reds.

### WINE RED

'Red Master' still leads this list. 'Blazing Star', 'Tristan', 'Alcyone' and 'Purple Queen' all have their admirers.

### DARK RED

'Mars', Van Meeuwen's new dark red was well received. This is a large flowering clone that should become very popular. 'Queen Superiora' and 'Franklin Roosevelt' remain popular.

### MEDIUM RED

Warmenhoven's 'Flamboyant' was well received and is a beautiful red. It, with 'Red Champion', 'Topscore' and 'Apollo' make up a quartet that is hard to beat. All are beautiful large reds of different form and are most outstanding. 'Red Champion' is huge and can win easily at the shows. 'Scarlet Triumph', 'Ludwig's Scarlet' and 'Wyndham Hayward' remain popular.

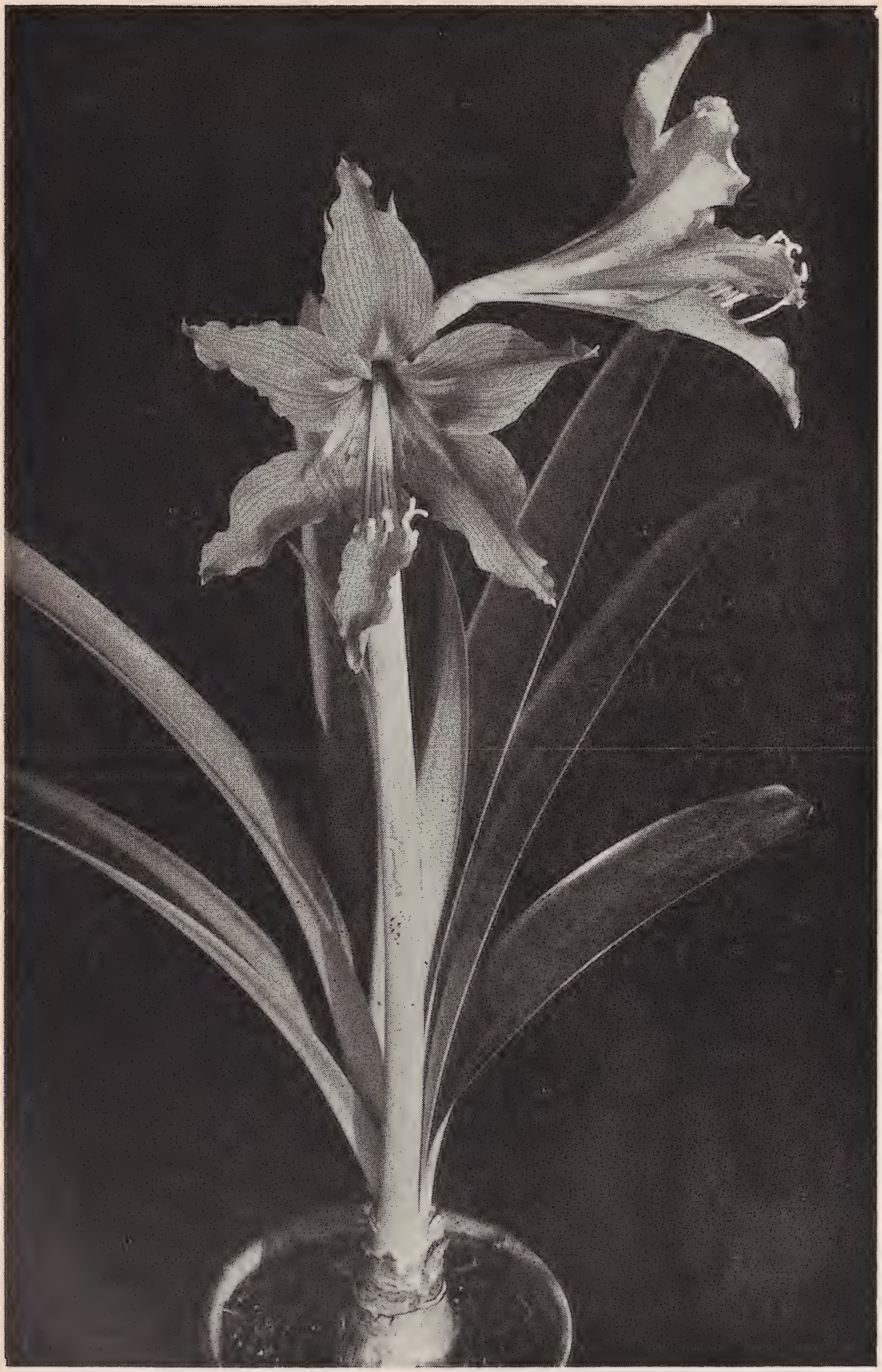

Fig. 26. *Amaryllis aulica* var. *platypetala* as grown by Sam Caldwell, Nashville, Tenn., from a bulb imported by Robert D. Goedert, Jacksonville, Fla., from Hawaii where it is naturalized. The species came originally from Brasil. Photo by Sam Caldwell.

### LIGHT RED

'Personality' is a rosy vermilion that has some yellow on the mid rib deep in the throat. It was well received last season and will increase in popularity this coming season. It is a very beautiful addition.

### ORANGE RED

The Hadeco African 'Orangedale', 'Terro Cotta' and 'Tangerine' are all nice orange red clones. 'Tangerine' flowers well from 22 cm size bulbs. It will often make 3 spikes. The flowers are up to 6″. It is an excellent pot plant. 'Traffic Stop', 'Lucifer', 'Don Camillo' and 'Cherokee' are all good orange reds.

### ORANGE

'Delilah' is still one of the best orange clones. It has a clear self soft orange color. 'Orange Wonder' becomes more popular each year and is possibly the leader in this group. 'Camellia' flowers darker each year and can be classified in this group or as orange red. Propagation difficulties may cause this clone to be discontinued. 'Salmonette' still remains popular.

### SALMON

'Home Decorator' is an outstanding new bronzy salmon that should become very popular as it is a new color that is most outstanding. 'Rilona', a buff or very light salmon is still sensational and a most beautiful clone. 'Bouquet' is still very popular. 'Queen's Page' and 'Salmonea' still perform well.

### SPECIES

The species continue to be hard to obtain and usually result in a financial loss to the importer. I was able to get 14 different ones from the wilds this past year; twelve from Brazil and four from Peru along with several lots of *Zephyranthes and Habranthus.*

The most promising of these species is SA63-12 from Santa Catarina Island, Brazil. It is said to be yellow. The growth appears to be that of *A. striata* and is very robust. If this one turns out to be truly yellow it will be a worthy addition.

The species SA63-11, said to be a white *Amaryllis* apparently is a *Hymenocallis* or *Crinum.* The growth is similar to *Hymenocallis speciosa* but less lance leafed than the species obtained from Van Tubergen of Holland. It is also distinctly different from the *Hymenocallis* LM63-3 received from Iquitos, Peru this season which is an exceptionally broad leaf form of *Hymenocallis.*

Three wild species received this past season have flowered. Species SA62-7 which is the true *A. blumenavia* from Santa Catarina, Brazil made spikes with up to 7 flowers. This is a beautiful little species and is growing very vigorously. Mixed in with the bulbs received as Species SA62-7 were some other bulbs that also had the typical pear shape of *A. blumenavia.* These bulbs were of a black color rather than the reddish color of *A. blumenavia* and were segregated out. Those that have flowered have turned out to be a form of *Habranthes robustus* and are possibly a little smaller than those in the trade and a more even pink tone. One bulb segregated with those considered to be *A. blumenavia* has a wider leaf than those found to be *Habranthus.* This may be a different form of *Habranthus robustus* or possibly an *Amaryllis* species. This single bulb is growing very rapidly and I feel it will produce flowers this summer if a *Habranthus* and next spring if an *Amaryllis.*

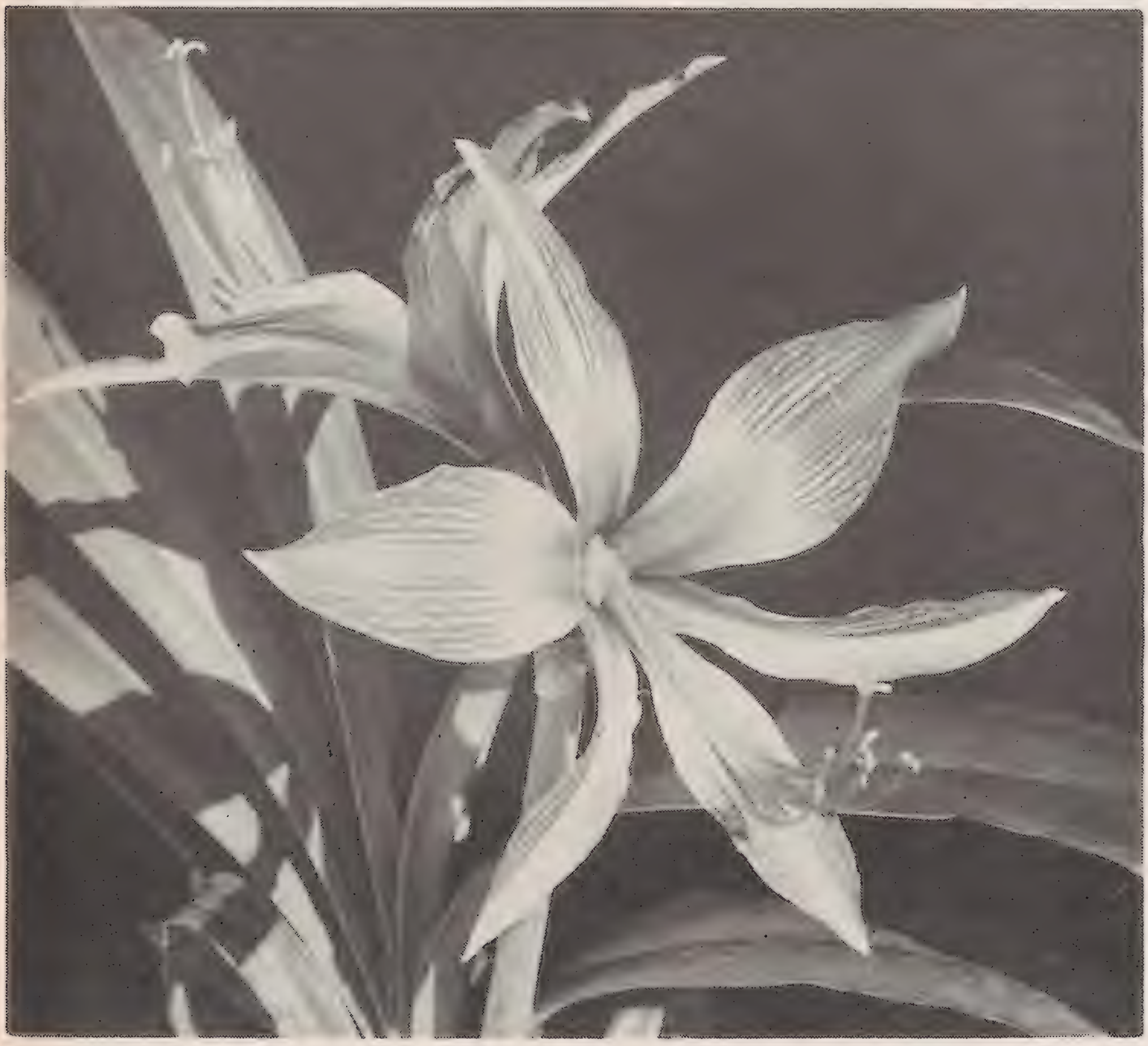

Fig. 27. *Amaryllis aulica* var. *stenopetala* as grown by Sam Caldwell, Nashville, Tenn., from a bulb imported from Santa Caterina (State), Brasil in 1959 by Dr. Robert D. Goedert, Box 6534, Jacksonville, Fla. Photo by Sam Caldwell.

The species PV63-2 from Kosnipata Valley, Cuzco, Peru, has flowered. The flower was small with two to the spike. It was very similar to the *Amaryllis* grown in India under the name of *Amaryllis belladonna* (syn. *A. equestris*). The foliage also resembled this species or hybrid. The only difference I could detect was that all petals except the lower petals had yellow near the center; however, the lower petal in PV63-2 was solid red. The form of the flower was very similar.

Species LM63-1 has just flowered. This species from San Martin, Peru, is mid-way between *A. belladonna major* (Type: *A. belladonna* Iquitos, My No. 8-61) and *A. belladonna* (syn. *A. equestris.*) (Type grown in India under this name). Species LM63-1 made 2 flowers to the spike of a very bright scarlet with white green center. The coloring is more like *A. belladonna* (syn. *A. equestris*) and the shape more funnel shaped. The tepalsegs are just as long as in *A. belladonna major* but the flower does not open up as flat. It is a beautiful clear color. The bulb has a much longer neck than *A. belladonna* Iquitos that grows at Iquitos, Peru, not too distant away. This is no doubt a form of *A. belladonna* which appears to grow wide spread and in many forms in this general area of South America.

I have recently received a 15th species from Santa Catarina, Brazil. This species grows along rivers in this area. It is a small variety which is whitish with a pink overtone. The adult bulbs are about ½″ in diameter. The basil plate of the adult bulb is larger than the bulb. They are white in color and appear much like a miniature *Haemanthus multiflora* bulb.

[Editorial Note.—This is *Nothoscordum inodorum* which is a noxious weed when grown outdoors in California as reported in an earlier number of Herbertia; when grown in the humid East it apparently is not such a nuisance. It is recommended that it be grown in pots and not allowed to go to seed. The bulb forms numerous bulblets which are the chief danger when grown outdoors in California.—*Hamilton P. Traub*]

Although my venture in collecting species *Amaryllis* has been a considerable financial loss to me, I do hope in some manner to continue these efforts in the future. I believe with the use of these species some one can develop more free flowering hybrids, new colors and shapes.

At present one collector is on a very extensive collecting trip through Bahia, Goias and Minas Gerais, Brazil.

It is hoped that this trip will produce some new and interesting *Amaryllis* species.

## GOLDEN RULES FOR GROWING HYBRID AMARYLLIS

MRS. A. C. PICKARD, *Houston, Texas*

Individual hybrid *Amaryllis* plants vary greatly in their behavior under cultivation. Some are almost evergreen; others lose all their leaves in late fall. Some delay their flowering for several months; others have a short dormant season.

These differences can be attributed chiefly to inherited factors, but also to a lesser extent to environment, and to the kind of culture given during the preceding season. Because of these variations it is advisable not to force into growth.

It is with these thoughts in mind that the following suggestions are made for handling hybrid *Amaryllis*.

(1) *Quality Bulbs*—''Plant a good bulb and you will have a good flower'' is an almost invariable rule. Purchase large healthy bulbs, for wise investment is not usually based on bargain offers.

(2) *Proper Handling of New Bulbs*—Keep bulbs in a cool dry place until time for planting. The bulbs may be stored in the home refrigerator. Place bulb in a plastic bag, fasten tightly and store at a temperature that keeps vegetables. This method is especially beneficial to hold bulbs dormant for a longer period.

(3) *Potting Procedures*—Select a clay pot to accomodate the size bulb. Avoid an overly large pot. An inch all around between bulb and pot is adequate. Prepare the clay pot by soaking twenty-four hours before using. Provide proper drainage and fill with the potting mixture to the level at which bulbs are to rest. This will vary according to the size of bulb being planted. Set the bulb firmly at a depth to permit exposure of the top third. Newly purchased bulbs may or may not have roots attached. If you want to be extra kind to your bulbs, coat the basal plate lightly with Rootone, a hormone preparation, just before planting. This deters bacteria and fungi which causes rot and has a beneficial effect on root growth.

(4) *Soil Mixture*—A proper soil for bulb growing remains important. Good soil may be prepared at home by combining 1 part sharp sand, 1 part well sifted garden soil, 1 part rotted dairy fertilizer (or ½ part dried sheep manure), 1 part leaf mold (or humus). Add 2 cups of bone meal, 1 cup super phosphate 20% to each bushel of mixture. Mix well until all material crumbles in your hands even when moist.

(5) *Rest and Resurrection*—Keep the newly potted bulb in a semi-dark place with temperature around 50-60 degrees F. for about six weeks for root making. Water sparingly. Too much moisture induces bulb rot. Also it stimulates foliage growth and retards the budded stem before it emerges from the bulb, sometimes even causing failure of blooms. When the bud is well protruded, move the plant gradually to light. Water more as growth advances.

With bulbs grown last year in pots or directly in the garden bed, to encourage early bloom, bring the pots indoors or lift plant from garden. Give them a complete rest from food and moisture until foliage has dried off—then retire them for rooting just as you would a new bulb with the same potting procedure. The bulbs are then ready to repeat their growing cycle.

(6) *Suitability to Environment*—The plants must be adapted to the condition which will exist when they are placed in a lightly shaded garden spot. Select a possible site for planting and prepare a rich soil in a raised bed, at least 6-8 inches above ground level, to insure perfect drainage. The bulbs appreciate moisture but not wet feet. The bulbs may work their way deeply into the ground, especially when planted in a friable soil. It would be rash to plant them too deeply in the first place as the bulb cannot make healthy foliage when the bulb is too deep beneath the soil. *Amaryllis* develop a great mass of fibrous roots but these will deteriorate rapidly in soggy soil.

(7) *Mulch the Garden Bulb*—After bulbs are planted it is beneficial to cover the soil with two to three inches of mulch to conserve moisture. Keep the soil cool, discourage weeds, and eliminate the need for cultivation. Mulching with organic matter plays an important role because it is rich in beneficial soil bacteria. Use the most convenient mulch obtainable in your area and it is advisable to provide extra nitrogen to counteract the "tieing up" of nitrogen by the decaying cellulose. A very heavy mulch will reduce danger of damage by a freeze and it is a must to be prepared for the unexpected.

(8) *Fertilizing*—*Amaryllis* are heavy feeders and enjoy a well balanced meal of nitrogen, potash and phosphates plus all the minor elements about which we hear so much these days. Natural, well rotted dairy fertilizer (sometimes hard to obtain) but most rewarding, reinforced with a nice top layer of decaying leaf mold benefit the plant directly. Whenever this material is not obtainable, any method of soil management that emphasizes a program of regular fertilizing and maintenance of good soil structure is a must for *Amaryllis.* Selection of a suitable fertilizer is a problem to be solved.

(9) *Moisture or Water Supply*—Water, the universal solvent, is the only way plants can obtain mineral nutrients. Plants absorb water through the roots and transpire it through the leaves and green stems. Adequate water keeps plants in good condition and greatly increases quality and number of blooms. Water loss is influenced by light, relative humidity, air temperature, and air movement. Purely local experience is of greater value than the broad advice that I must give to suit all conditions. The depth and density of the water absorbing surface is dependent on the type of soil.

(10) *Effect of Cutting Flowers*—One of the frequent questions asked concerns the cutting of blooms. It may even strengthen the plant if the blooming scape is cut when the flower is partially opened. The flowers will develop just as well if the scape is placed in about 2 inches of water. Wrapping a small rubber band around the base of the scape will prevent splitting and folding up of basal sections. All *Amaryllis* are splendid for indoor display and may be cut with as long a scape as needed with caution not to cut too close to the bulb. Remove faded flowers and scapes as the hollow scape of the *Amaryllis* contributes very little to the bulb but is a great strain on the bulb if allowed to remain and form seed. Therefore, it is best to select only the parents needed for hybridizing. Occasionally the mother bulb will skip a year or so of blooming after pollination and seed setting. But, ripening of foliage is essential. The period of yellowing leaves is vital to the development of the new bulbs. It is at this time that it stores food which will carry it over to the next season.

Growing Amaryllis is a never ending source of enjoyment.

# GROWING AMARYLLIDS AND OTHER SEEDLINGS ON WATER

DAROLD DECKER, *Chula Vista, California*

Sometimes I wish that I hadn't thought of it. For over 3 months the various angles of it have completely ''plagued'' me.

It all began while reading Dr. Traub's AMARYLLIS MANUAL, page 123, in which he recommends floating *Amaryllis* seeds on top of tap water for 24-48 hours prior to planting. The thought kept recurring to me, ''floating seeds on top of tap water,'' until I did just that. I filled a small open-mouth jar about ¾ full of water from the faucet, and sprinkled in about 25 *Amaryllis* seeds. They floated like little boats. Well, I didn't leave them float for a mere 24-48 hours, but just *left* them float. Within about a week, I held the jar up and could see clean white roots emerging from the seed. ''This is interesting,'' I thought; ''why not just leave them float some more and see what happens?'' They continued to grow. After a month here is what happened: they had developed the radicle-root about an inch in length, the cotyledon-leaf nearly the same length, and a miniature bulb. All of this in nothing but water. At that stage I transplanted them to a flat of well-decomposed oak leaf mold, which I haul in from the mountain areas, about 40 miles east of San Diego, and which I find very satisfactory for starting things, as it is entirely free of damp-off and clean and friable. I soaked the flat prior in water, left drain, made good size holes with my finger, and inserted the roots of the tiny plants. Then I placed the flat in the cold frame and covered about ten days with a cloth sash. This, then, is essentially all there is to it.

But it still intrigued me. Another test June 13th is still in water at this writing (September 23rd). The water remains almost crystal clear, some of the cotyledons are about 6″ in length. About 3 weeks ago they seemed to be getting a little pale, so I added a small amount of fertilizer solution. I believe this helped as they are of a healthy green color now. They continue to float as aquatic plants, mostly entirely submerged in the water.

More recently I thought, ''If *Amaryllis* can be started this way, there must be many more kinds of plants that could be similarly started.'' I have since experimented with such things as Zinnias, Marigolds, Gerbera, Salvia, Petunia, Snapdragon. Germination has been excellent with all. However, the Zinnia, Marigold, and Gerbera became clouded and murky, apparently with fungus development. The Petunia and Snapdragon jars, however, have remained perfectly clear. It is curious to note that these tiny Petunia and Snapdragon seeds soon sink to the bottom of the jar, though in this way completely submerged, their germination appears to be in no way impaired. After germination, the young plants become detached from the seed hull and usually float at or near the surface. The plants are now 3 weeks from sowing, perfectly healthy and seem completely at home in water. It is curious to note that with time, the plants seem to toughen, and even though small can be quite readily handled. I have transplanted to flats of leafmold tests of these Snapdragon and Petunia seedlings without difficulty. I believe the limits of most plants in water is the development of the cotyledon stage. However, Salvia has developed a rather extensive little fibrous root system, and fairly large true leaves already.

This novel method of growing seedling may, therefore, be divided into two parts: (1) Sowing seeds on water, for which I am indebted to Dr. Traub's suggestion, and (2) leaving them float. I believe with *Amaryllis* that they should float from 4 to 6 weeks. That is, they might as well float for that length, as they suffer in no way in the water, and as they develop to a larger size, are easier to handle.

Another more recent thought with me, which I believe is of importance with this system, is the use of boiled water to eliminate any possibility of fungus development from the water itself. Also, I purchased some heavy plastic dishes (made by Tri-State Plastic Molding Co., Chicago, and I believe available at most dime stores.) These are rather inexpensive and come in several sizes. They are clear like glass, and have a lid. For example, size 5″ x 6½″ x 2½″ deep will conveniently hold about 100 seeds, and on the label is the description: ''New high heat material, can be scalded to insure germ free protection.'' After the water came to the boiling point, I poured it into these plastic containers, and immediately replaced the lids and left cool. After complete cooling, I sowed to more *Amaryllis,* Marigolds, Zinnia, and Salvia, immediately replaced the lids, labeled, and stored on a shelf. My theory here, besides positive elimination of all possibility of fungus from the water, is that the floating seed is protected by the lids from contamination from mold fungus in the air. Many seeds are like bread under humid conditions, they attract mold, which is pretty much everywhere, and this is particularly serious when directly exposed to air, either atop water or soil. So far this phase of the experiment looks very promising with roots on the germinating Marigolds and Zinnias very clean, and comfortable looking, floating on the water. Boiling the water and using a container with a lid, and never removing the lid during the experiment is, I believe, a very worthwhile idea, and offers positive protection of growing the seedlings in a completely sterile media.

Still thinking on the problem, just yesterday I happened upon the thought of adding a bit of fungicide to the water. Something that would completely control all fungus development either from the water, container or seed, without affecting the development of the seedling. I believe this is a very practical approach, and might solve things completely. I have tried weak solutions of Manzate, a manganese compound widely used as a spray to control various fungus developments on plants, and also ''Lavoris'' brand mouth wash, which is largely zinc chloride. Both seem very effective against plant fungus, and only further time will tell of the effect on plants. It seems likely that something could be used to give positive control, without interfering with the normal development of the young seedlings. It is essential for the normal development, that all mold should be kept from developing.

All of this is, of course, very simple. One doesn't need expensive equipment. It doesn't take up much space or any considerable time—in fact, one of its purposes is to save time. I believe I have some of the essentials figured out, but it is likely that others may think of variations of the idea, refinements or better ways of doing it. It's at the beginning. I am sure it will appeal to the hobby gardener, and may even have practical application for the grower of larger amounts. I believe it will be found that many if not most seeds actually germinate better and at higher percentage in sterile water than in soil or other media. For this reason, it is possible that this method will have further practical application for seed firms who regularly run germination tests of seed.

I mentioned this idea of floating *Amaryllis* seed on water to one of the retail catalog firms, to whom I sell (I am in the wholesale flower-seed growing business), and they recently wrote, ''You will be interested to know that we had the best germination with the *Amaryllis* by sowing it on water as you suggested. We had no success using Vermiculite and fair germination with soil.'' Actually, I have had pretty good luck planting *Amaryllis* in Vermiculite in plastic containers, as has been described in the Amaryllis Year Book. However, I am sure floating on water is better. I believe one can be assured of the *maximum* germination. Later, I showed my results to a visiting customer-seedsman, and he was amazed to see these plants growing in the jar of water. I believe this would be the reaction of most people. It amazes me, yet, every time I look at the jar, and fills me with wonder.

Of course, no seed will germinate unless it contains life. *Amaryllis* and many other types of seed will attract fungus, especially during the warm humid months of late Summer and Fall, especially in the Southern and Eastern States. The seed pods should be left on the flowering stalk until they have matured. At this stage they will split apart, and may be removed, and should be thoroughly dried on a tray in the sun a week or so before either planting or storing for future planting. The pods should not be lumped together in a bag, while still containing moisture. Most seed firms have especially made air-tight rooms, in which the moisture is mechanically removed, and the humidity constantly kept very low, at a relative humidity of 30 or less. Many seeds that normally rapidly deteriorate may be kept in high germination for long periods—often many years, by this method. This, of course, is out-of-the-question for anyone not in the seed business. However, it is likely that sometime someone will find a simple and inexpensive way of maintaining the germination of small amounts of seed. I have been thinking, and plan to try a little experiment of storing packages of small amounts of seed in a south window, so that they will receive a good ''drying-out'' for several hours daily. This may be sufficient to prevent development of fungus on the seed, which I believe is the main reason for rapid deterioration of *Amaryllis* seed. If stored in a closed room, I believe an open can is better than bags of either cloth or paper, as it is likely that these in themselves attract moisture. This spring I planted 144 seeds in leafmold of an *Amaryllis* strain.

This seed had been stored in an open can, without humidity control. It was something that I wanted to get the most of. This seed was 11 months old, and I got 96 to germinate. Another word of caution about storing seeds. Never store seeds in a tightly closed container, unless the moisture level of both seed and container air has first been lowered very considerably. Since this is difficult or impossible without a rather expensive set-up, it should not be considered. Some might get the idea, too, of storing seeds in packages or bags in a closed jar or other container, with calcium chloride or other desiccant at the bottom to withdraw the moisture. This sounds reasonable. Many of the mechanical dehumidifiers operate under the theory of blowing air through a desiccant. However, under stable air conditions, a check with a hygrometer shows that calcium chloride doesn't lower the humidity to a safe level. The humidity remains too high to prolong the life of the seed. The germination is down. I have tried it.

Perhaps the best and certainly the most convenient way of maintaining seed germination of small seed lots is to place in a refrigerator. Here, one has the advantage of a cool temperature and a dehumidifying action, both of which are designed to promote the long life of seed. The life of certain seeds respond differently to different temperatures. Certain seeds will be killed by too low a temperature. However, I have kept, and at this time continue to have samples of certain seeds in the freezing compartment of my refrigerator, imbedded in ice, and at around 0°F. Some of these samples have been in such a state now for 3 to 4 years. I tested the Gerbera a year or so ago, and it showed no appreciable loss of germination. Normally, it is very short-lived. Salvia, on the other hand, is completely killed by this low temperature, though continues to germinate very well when stored at about 40°F. I have never tested Amaryllis seed under these conditions. Though this would be a very interesting experiment for someone.

Without question, the very best way for the person with small lots of *Amaryllis* seed and other types of relatively short-lived seeds, whether you save it yourself or buy it through a seedsman, is to plant it as soon as possible. Sowing on water is made to order for this. *Amaryllis* clones bloom and the seed matures over a period of several months. Sowing on water is certainly a most convenient way to handle crosses and seed from selections as it is mature and ready.

The real ''beauty'' of this water culture is that when once the seed has been sown, there is absolutely no further work until the seedlings are ready for transplanting. One could just as well go on vacation. The only precaution is that the temperature should be maintained above 60°F, and that the containers should not be placed in direct sunlight.

Under this method, too, you are growing in a perfectly sterile medium. About the only possible contamination is through the seed itself. This method is certainly less trouble and more fool-proof than sterilizing or fumigating soil to guard against soil-borne damp-off and other fungus diseases, which can attack the seed itself in the process of germination. These problems are normally ever present for all growers, either the hobby gardener or one commercially engaged.

This method seems to fit the giant hybrid *Amaryllis,* perhaps many of the other amaryllis equally well. However, there are likely many other types of plants that can be just as well started in this way. I have always remembered the experience of Mr. Orpet, as told in the 1956 Yearbook, page 11, regarding *Alstroemeria violacea,* to quote: ''Mr. Orpet procured 300 seeds, along with instructions for planting all of which indicated that no matter what the treatment of seeds ''vernalization,'' cold or hot treatments, chipping, sulphuric acid, soaking in water, etc.,'' there must be a full year from planting to germination, and flowering might take place five months after that. Mr. Orpet put his seeds in a pan of water, was called away for nearly two weeks and remembered in panic that his seeds were still soaking on his return. He found each seed showing a little white germinal point, sowed them at once (in April) and was rewarded not only with a quick germination but 350 little plants (owing to a double embryo in some) a few of which flowered in June of the same year.'' So it is entirely likely that use of this method with *Amaryllis* is only a beginning. I am personally making tests of sowings in water of such tough germinating items as Canna and Rose, though won't hazard yet just what my luck will be.

I won't go all-out and say this *is* the way to start all seed. There are undoubtedly many variations of the method. Certain seeds may be better started this way, and transplanted to ground immediately upon signs of germination. Others are so easily started directly in soil that prior germination in water may prove just extra work. Too, there will be other types that can be germinated in water, though upon germination should not be left in that state perhaps more than a week, as they may not develop chlorophyll normally in water. And there will, certainly, be others that may advantageously be left in the water much longer than a month, and, with the addition of small amounts of nutrient, will develop quite normally under these conditions, prior to later transplanting to soil. I would think that certain easily grown kinds like Zinnia and Marigold could be transplanted directly to a prepared spot in the garden about 10 days after germination, with some immediate protection from sun and wind.

I wish to stress, too, that this, even to me, is still very much in the experimental stage. With this in mind, I believe it is very desirable to proceed modestly. At first test your methods in a small way. Don't start with your rarest seed, your most important crossed seeds, or your most valuable lots.

Above all practical values that this method might unfold for you, I believe as with all people who like to grow things and to whom germination and plant growth and development have something mystical and magic about them, you will enjoy peering daily through the glass or plastic container (for this reason glass or plastic is preferable to a metal container) and watch the seed germinate and develop into miniature real life plants. Grown in soil one actually observes only the upper half of the plant.

# WINTER HARDINESS OF SOME AMARYLLIDS IN CENTRAL NORTH CAROLINA

William Lanier Hunt

Recent severe winters have tested out the winter hardiness of many amaryllids. Since the writer's arboretum is right on the margin of hardiness for a number of these plants, the following report may be of some value.

Lycoris, sternbergias, rhodophialas, crinums, hymenocallis, zephyranthes, *Nerine bowdeni* and other amaryllids are grown in quantity here toward the northern end of Zone 8 in the South Atlantic States. The arboretum is located on the eastern edge of piedmont North Carolina. Before the recent extreme winters, the average of low temperatures for Zone 8 was 10 degrees above zero. The lowest temperature was usually 4 degrees below zero for several hours between 2:00 A. M. and dawn. With the coming of day, plants were subjected to bright sunlight (usually with no snow or ice cover) and sometimes to a rise to above freezing: the worst situation an evergreen plant can undergo.

Before the recent severe winters came along, the common old sterile form of *Lycoris radiata* bloomed profusely in most seasons. In 1959, however, a northeaster brought below freezing temperatures in November which damaged the foliage of this plant so badly that almost none of them bloomed in September, 1960. In protected places, they flowered normally.

Unusually deep snows in 1960-61 resulted in only 10 per cent of normal bloom in September, 1961. Then severe drops in temperature in 1961-62 down to 10 below zero with no snow cover had the same effect: about 10 per cent of normal bloom in September, 1963. The winter of 1962-63 was much like the previous one, and the effect this September was about 2 per cent of bloom in these same beds of several thousand bulbs.

Weeds and honeysuckle, however, had overgrown a very large new planting of these ''red spider-lilies'' as *L. radiata* is called in the South Atlantic States. To the writer's utter amazement, this new planting bloomed normally! So winter protection is very practical for *L. radiata* in Zone 8. We are relieved to know that, with a little trouble, we can be assured of blossoms in spite of 10 below zero for several days together in the December till Valentine's Day period.

It is good to be able to report, also, that *Lycoris elsiae*, which had flowered profusely every year before the past four winters, produced this year about 10 per cent of its normal crop of blooms in spite of the same deep freezes. Last winter, some beds of this species were protected by laying a light covering of ''pine tops'' (boughs) over them after the cold set in. In one large bed, there were no flowers this year, but in another, protected the same way, there was a 10 per cent flowering.

The new Dresden yellow *Lycoris* which fades to cream, and the new porcelain rose *Lycoris* (both described elsewhere in this issue) seem to be a bit hardier to cold than *L. elsiae*. This is possibly owing to the slightly thicker foliage of these two new plants. In beds of *L. elsiae* where they were growing, they flowered when *L. elsiae* did not.

Here in the upper end of Zone 8, *Lycoris aurea* is not a practical outdoor flower. A bed of 100 bulbs planted back in the forties just wasted away until there were only a few feeble ones left in ten years. It is good to know from Mr. Caldwell that this species takes kindly to cool house treatment in deep boxes.

*Lycoris traubii* is hardier than the above because of its thicker, tougher foliage, but it also succumbs to the same difficulty as that of *L. aurea*: the foliage is too tardy in the autumn, and the first hard freezes damage it or destroy it outright. In some seasons, both of these lycoris will get ahead of the frosts, develop to the safe point and 'tough-it-out' with the winter. *L. traubii* then gives about 2 per cent of bloom, but *L. aurea* does not get up enough strength to bloom. Watering from September on will hasten the coming of the leaves of these two lycoris and might make them practical if a frame were then put over them. It will be a godsend if Mr. Caldwell's new yellow lycoris with spring foliage can fill the gap left by these two tender yellow species.

Before the past severe winters, *Lycoris squamigera* has nearly always supplied us here with great crops of flowers. In perhaps one season out of ten, it would be off and only an odd flower or so would appear. Recently, however, the late freezes in March and even in April have so damaged the foliage that this species has flowered only at about 25 per cent of normal.

*Lycoris incarnata* has never, during some twenty years flowered very profusely here, and it has bloomed even less during the past severe winters. In the experience of this writer, this species is chary of bloom until it has developed clumps of six or more bulbs. Does it bloom better in a drier clime or in limestone country? It seems to be grown as a cut flower in Italy.

*Lycoris sanguinea,* L. ''cinnabarina'' and their forms have been moderate bloomers here. Even in the past severe seasons, they have given 50 per cent of their normal bloom.

We have saved the best for the last and are happy to report that *L. sprengeri* has bloomed lustily every single year during the past few seasons. There has been a small colony of it here for some ten years—now increased to fifty to one hundred bulbs. This species looks rough and ready. The spring foliage has a little tiny red edge that may indicate its experience with extreme cold in its native habitat. Mr. Caldwell's ''Sprenrad'', then, combines the two most winter hardy lycorises and ought to be extremely valuable as far north as any lycorises will go. My own seedlings of this same cross certainly stand up to the worst the winter can produce.

The best form of *Sternbergia lutea* which I have grown for some thirty years has always come through the winters unharmed. Thick foliage, again, seems to be the deciding factor, for two batches of imported bulbs have thin leaves and often get damaged by freezes. Perhaps gardeners who report no success with sternbergias are trying to grow the thin-leaved types.

The past two winters have had some effect on even the best type of *Sternbergia.* Where a bed of several thousand bulbs extends out from under large sweet gums and oaks, the bloom was sparse this year (though foliage showed no injury), but the bulbs back underneath the trees bloomed as lustily as ever. This good type of *Sternbergia* is apparently one of the hardiest of all amaryllids. The same may be said of *S. fischeriana,* the fall-winter-spring blooming species which the writer has described and praised before in HERBERTIA. The twisted foliage of this species stands up to the worst that winter can bring on and flowers appear right in the snow as soon as the sunshine returns.

*Rhodophiala* x *huntiana* foliage has always been damaged by extremely low temperatures, but these floriferous bulbs can send up a new set of foliage as soon as warm weather comes in spring and bloom normally every August. The writer once performed an experiment with rhodophialas. Winter had destroyed one set of leaves on the bulbs and the new leaves had no more become mature than they had been cut off by the man mowing the lawn. Noticing that more leaves began shortly afterwards to come up, the idea struck us to see how long it would take this foliage to grow. It was then late June, but this third set of foliage developed rapidly until it had its full length. Shortly afterwards, the foliage was cut off some of these bulbs to see whether or not they might possibly come out again. To everyone's amazement, they did so right away.

Since the bulbs in question were in a bed of rich soil where flowers were growing, they received regular waterings through July and August, and their foliage again developed to normal size. At this point, one could not resist the temptation to remove the foliage from a few bulbs again. Still another set of leaves was produced, and many of the bulbs in question flowered at their normal time in late August.

Somewhere, the writer has read that this little *Rhodophiala* comes from an area in the mountains of Argentina where the soil slides off steep mountains, often burying the bulbs very deeply. This must account for the sometimes six- to nine-inch necks on the bulbs. The ability to produce successive sets of leaves when damaged makes this one of the most indestructible of the amaryllids.

## AMARYLLIS CULTURE UNDER ARTIFICIAL LIGHT

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The number of years an *Amaryllis* can be grown successfully under artificial light can only be answered by continued experimentation. After growing *Amaryllis* under artificial light and observing all phases of good culture, I am confident that *Amaryllis* species and hybrids can be grown indefinitely with success. (See Plant Life 1963, pages 107-110.)

As described by this writer in an article ''Artificial Light for Amaryllis Growth'' in Amaryllis Year Book 1963, the lighting arrangement has remained the same. The cool white fluorescent tubes used in the past had been replaced during the spring of 1962, with "Gro-Lux" fluorescent tubes. In replacing the cool white fluorescent tubes with "Gro-Lux" tubes, I have placed most *Amaryllis* bulbs in two size groups to utilize the growing area and light source to the greatest advantage.

The first group consisted of all small sized bulbs placed under the light source twelve inches between the fixture and the tops of the pots. Most of the pots were three inches in size and consisted of *Amaryllis blumenavia, A. elegans* var. *divifrancisci, A. cybister, A. evansiae, A. striata, A. striata* var. *fulgida, A. mollevillquensis, A. reticulata* var. *striatfolia* hybrid, "Mrs. Garfield" and a number of unidentified species.

The second group consisted of the larger size *Amaryllis* bulbs placed under the light source twenty four inches from the top of the pots. Most of the pot sizes vary from five to seven inches. Included in this group are *Amaryllis belladonna,* and its varieties, *A. aulica, A. aulica* var. *platypetala, A. immaculata, A.* x *johnsonnii, A. pardina, A.* x *acramannii* and the various strains, some of which I find difficult to grow out of doors.

There are many plants, which have wider tolerances and become easily satisfied for continual development. Of course there will also be some bulbs which will need special care because if they are lost, replacements will be hard to find. All phases of culture, containers, growing media, fertilizing and watering, play an important part under conditions of an enclosed environment.

Today many substitutes are being offered for clay pots, but clay pots offer the greatest advantage in my growing area, especially when fresh air circulation is limited during the cold winter and spring months. Clay pots being porous, help promote aeration of the growing media and I find this beneficial to the healthy growth of the *Amaryllis* bulb.

The only disadvantage of clay pots is the accumulation of fertilizer salts from heavy feeding during active growth. If there should be fertilizer salt accumulation, it is best to clean the clay pots as the *Amaryllis* starts its resting stage.

At the start of growing *Amaryllis* under artificial light I used various growing media to see which gave the best results for healthy growth under the environment created. Presently the commercial mixture "Black Magic" has given excellent results for all bulbs. The main reason for its use besides being clean and odorless is that the need for organic fertilizers is eliminated. In some cases I added sand, perlite or leaf mould. When soil mixtures were used, continual watering and fertilizing usually packed the soil, creating poor aeration and eventually rotting the base of the *Amaryllis* bulb.

Since organic materials such as manures, bone meal, etc., are essential for good *Amaryllis* growth, their use indoors in a confined area would be unbearable. In using "Black Magic" mixture, excellent results were obtained with soluble chemical fertilizers. During active growth of the bulb, two soluble fertilizers were used, with good results, Rapid Gro (20-20-20) and Hyponex (7-6-19). A monthly application of muriate of potash was used, with good results.

During active growth all *Amaryllis* respond to heavy fertilizing. In using commercial fertilizers, various factors have to be taken into consideration, to obtain maximum efficiency. Depending upon whether they are *Amaryllis* species or hybrids, pot size, air circulation, heat application, fertilizing and watering will vary. As pot sizes vary, fertilizing and watering will also vary. The best guide I have found, as soon as the surface of the growing medium shows signs of drying, then the bulb is watered or fertilized. I try to alternate watering and fertilizing and when possible use collected rain water.

Many of the *Amaryllis* species which I have, are impossible to grow out of doors. The *Amaryllis* hybrids, a majority of which bloom in the spring, are about the only bulbs placed out of doors for continued growth.

*Amaryllis aulica,* the species which I have grown longest (4 years) under artificial light in the complete absence of sun, has bloomed faithfully for me for the past four years. Under artificial light *Amaryllis aulica* will remain evergreen, with active growth starting in October. The bulb will bloom during December with the flowers lasting a period of two weeks. After blooming, the bulb sets new leaves with the older leaves yellowing. Watering and fertilizing are continued until June when fertilizing is discontinued, but it is watered to keep the growing media moist.

During the blooming period of December 1962 *Amaryllis aulica* put out two flowering scapes and this caused the bulb to decline considerably. I doubt whether the bulb will bloom the fifth year.

The summer flowering *Amaryllis* x *acramannii* is another excellent bloomer under artificial light. The flowers of the bulb are very erect and do not fully develop. *Amaryllis* x *acramannii* like *Amaryllis aulica* is treated as an evergreen. The blooming period for this hybrid has been between the first and third week of July. The second year under artificial light this bulb produced one offset with the mother bulb increasing in size each year.

*Amaryllis striata* which blooms in January is another species that remains evergreen. This species shows more vigor than its variety and is easily grown under artificial light.

*Amaryllis striata* var. *fulgida,* another evergreen species is unpredictable in its blooming period. Some of the bulbs have bloomed in June, others have bloomed in October and January. As soon as this species blooms, it has a tendency to enter a resting stage and watering and fertilizing is withheld. The growing medium is kept moist, but if overwatered, this bulb will rot. The flowers of this species under artificial light, last longer than most of the species.

*Amaryllis belladonna* var. *major* is another good grower under artificial light. A one third proportion of sand is added to the growing mixture of ''Black Magic'' for this species, with good results. This species also remains evergreen under artificial light, with active growth starting in the latter part of February. Watering and fertilizing is continued to the end of October and afterwards this species received just enough water to keep the growing mixture moist. Under artificial light the bulb I have has produced one offset during a two year period.

*Amaryllis immaculata,* another summer blooming species with its active growth starting in June, has not been successful with outdoor culture. When this species was received and grown out of doors, it was impossible to get it to bloom. Under artificial light this species is a good grower, with active growth lasting until January when it will go into a dormant stage. During the dormant period of this species, watering is withheld completely.

*Amaryylis aulica* var. *platypetala* is treated as an evergreen species. During August and again in October this species will put forth vigorous leaf growth. The flower form is similar to *Amaryllis aulica,* but the color is a pure crimson with the absence of green in the throat. Until the present time this plant has bloomed during November.

*Amaryllis reticulata* var. *striatfolia* hybrid ''Mrs. Garfield'' is a clone, which shows evergreen characteristics under artificial light. The potting procedure has been similar to that of *Amaryllis striata* var. *fulgida* with the bulb resting on top of the growing media. Active growth starts during August and lasts to May when the leaves yellow. Usually this bulb puts out from three to five leaves and has not bloomed for me after two years growth under artificial light.

Recently three bulbs of *Amaryllis evansiae* were received from Mr. Wyndham Hayward. Good results were obtained when two of the bulbs were planted with the neck of the bulb protruding above the soil line. The one bulb planted with the lower half placed in the growing medium, declined and eventually rotted. Since planting, the remaining bulbs have retained their leaves with moderate watering and fertilizing. In watering *Amarylliss evansiae* I find it best to allow partial drying of the growing medium. The bulbs I have are small and because of this I have been handling them as seedlings.

*Amaryllis elegans* var. *divifrancisci* as well as *Amaryllis cybister* are two bulbs which when planted, remained dormant throughout an entire growing season. Even with bottom heat it was impossible to break their dormancy.

*Amaryllis cybister* showed good growth when its dormancy was broken the following growing season. During the time when dormancy was prevalent, watering caused decline to that portion of the bulb above the soil. The following season the bulb was planted with just the neck of the bulb above the soil line. Active growth was good, starting in April and by the end of August this species was in its dormant stage.

When dormancy in *Amaryllis elegans* var. *divifrancisci* was broken the following season, this species gave poor growth. The leaves put forth extended about a half inch in length and remained this way throughout the remainder of the season. Whether this species will give better growth the following season remains to be seen.

The past few seasons Mr. Robert Goedert of Jacksonville, Florida has offered many interesting *Amaryllis* species from South America. Practically all the bulbs which I received were good growers under artificial light during the first season. Many put forth offsets and these showed good growth when left attached to the mother bulb. Those detached from the mother bulb and not having some root system tend to go dormant.

One noteworthy species from Santa Catarina, Brazil, was received from Mr. Goedert and identified by number SA62 7. What makes this species distinctive from the others is the leaf structure and the pattern set by the eight leaves the bulb puts forth. The bulb showed vigorous growth in the late winter when received and continued growth until early August when it went into a semi dormant stage. At this writing the bulb is starting active growth and I am hoping for it to flower at this time.

The leaf at its narrowest point was 1/8-inch (petrole) and two inches at its widest point (blade) with the length of the leaf measuring approximately nine inches. The petiolate leaf formed by this species and its miniature form makes this a noteworthy addition to any collection. [Editorial Note:—This is apparently *Amaryllis blumenavia.*]

Practically all *Amaryllis* species I have received were devoid of any root system. Many of the species i.e., *Amaryllis cybister, Amaryllis elegans* Var. *divifrancisci* and some of the unidentified species remained dormant throughout an entire season. Care must be taken in watering because over watering will cause decline and eventual rotting. Hormone powders have helped, but patience will still have to be exercised.

I believe it is best to encourage a good root system even at the expense of losing a flower bud of any given species. When allowed to flower the bulb will decline and in some instances start to rot.

Bottom heat has also helped in breaking the dormancy of some of the species, but care must be exercised. When bottom heat was used, placing the potted bulb on top of the fluorescent fixture has been sufficient.

One of the greatest advantages in growing *Amaryllis* under artificial light is in handling them from seeds. We have an uninterrupted season for continued growth, which is necessary in growing *Amaryllis* from seeds. The handling of *Amaryllis* from seeds is a subject which I would like to discuss in a later article.

## GROWING AMARYLLIS CALYPTRATA FROM SEEDS

Burr Clouette, *California*

My *Amaryllis calyptrata* seedlings are now almost 18 months old. All of those which I have not traded off are thriving. One bulb is far ahead of the others in size. The bulb is all of two inches in diameter. The two largest bulbs were grown in the house under Gro-Lux lights. This would seem to indicate that this type of lamp is excellent for growing *Amaryllis* as well as other plants.

The *A. calyptrata* bulbs are all planted in Black Magic planter mix, and are fertilized regularly. One of the bulbs is still in its 3½″ square plastic pot; three others are now in 5″ clay pots, and the largest is in a 6″ clay pot.

*Amaryllis calyptrata* is evergreen and seems to grow the year round. I have not noticed any pronounced periods of inactivity, as in *Amaryllis evansiae,* which is also evergreen but is inactive at times. *A. calyptrata* also seems to like lots of water and fertilizer. I keep the potting mixture at least damp at all times.

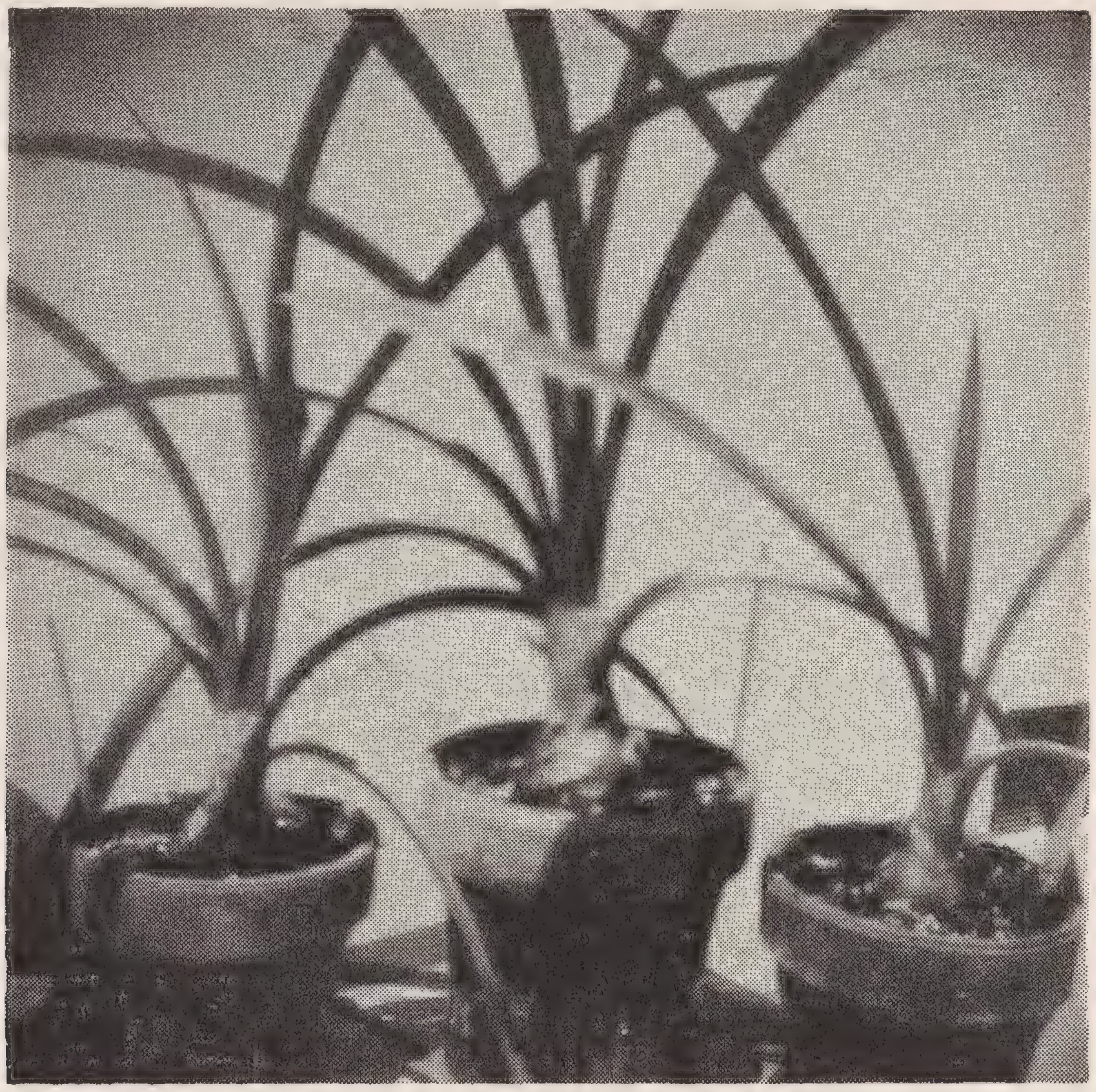

Fig. 28. *Amaryllis calyptrata* seedlings as grown by Burr Clouette, San Diego, Calif.

I hope that my largest bulb will flower next spring (1964).

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(CONTINUED from page 53.)

THE ORIGIN OF ADAPTATIONS, by Verne Grant. Columbia Univ. Press, 2960 Broadway, New York, N. Y. 1963. Pp. i—viii + 606. Illus. $12.50. This important new book by an outstanding authority on the causal theory of bioevolution as applied to diploid sexual organisms will be welcomed by all biologists. In Parts 1 and 2, the author lays the general foundation for Part 3, in which the genetical theory of bioevolution within populations is detailed. In Part 4, he extends the exposition to include the formation of primary evolutionary population units. In Part 5, the bioevolutionary process as previously explained is applied to the subject of the hierarchic lineages. Dr. Grant has given by far the best presentation of the bioevolutionary process up to the present; incorporating not only the previously published information but also original contributions of his own. This stimulating, clearly written text is highly recommended to students of bioevolutionary theory, and also to biologists generally.

(CONTINUED on page 118.)

# PLANT LIFE

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GENERAL EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 150, La Jolla, California

(CONTINUED from page 116.)

EXPERIMENTAL BIOLOGY, by R. W. Van Norman. Harcourt, Brace, Englewood Cliffs, N. J. 1963. Pp. 243. Illus. This is an introduction to methods, techniques and instruments used in experimental research in biology, and is particularly useful to the beginning student. The introductory chapters are concerned with science and research in general, and biological science in particular. The main body of the text is devoted to the methods, techniques and instruments commonly used in experimental biology. The concluding chapters are concerned with the design of experiments; the handling of experimental data; and the preparation of manuscripts. Highly recommended.

SELECTED BOTANICAL PAPERS, edited by I. W. Knobloch. Prentice-Hall, Englewood Cliffs, N. J. 1963. Pp. 311. Illus. Realizing that for many the first course in plant science is usually the last, the editor has provided a rich harvest of background material for the course. This is calculated to make it rich in cultural, aesthetic and philosophic values. The background papers, selected from ancient, middle modern and contemporary sources, are arranged under such headings as the importance of plants; development of botany; ecology; phytogeography and exploration, etc. This is a valuable companion for both the plant science teacher and the student, and is highly recommended.

THE DEVELOPMENT OF HOMEOSTASIS, edited by E. F. Adolph. Academic Press, 111 5th Av., New York 3, N. Y. 1962. Pp. 218. Illus. $7.00. This book makes available the Proceedings of a Symposium on the Development of Homeostasis, with Special Reference to the factors of the Environment. The symposium, in which 39 outstanding authorities participated, was held at Liblice in 1960 under the Chairmanship of Dr. E. F. Adolph. The three concepts discussed ranged from (a) homeostasis (physiological regulations; homeokinesis; maintenance of constancy); (b) the study of ontogeny of regulatory phenomena in organisms; and (b) the study of body fluids, and their maintenance. This stimulating book is required reading for all physiologists. Highly recommended.

GENETIC EFFECTS OF RADIATIONS, by C. E. Purdom. Academic Press, 111 5th Av., New York 3, N. Y. 1963. Pp. 173. Illus. $7.00. This concise, clearly written book by an outstanding authority is intended for the intelligent layman, and also for students and workers in various fields of science. The Chapters are devoted to basic radiation physics; principles of heredity; genes—the material of heredity; the production of mutations by radiations; quantitative aspects of radiation mutagenesis; factors which modify the genetic effects of radiations; genes in populations; mutation in man; and genetic radiation hazards in man. Highly recommended.

ATOMIC ENERGY ENCYCLOPEDIA IN THE LIFE SCIENCES. Editor and major contributor, C. W. Shilling, and Miriam T. Schilling. W. B. Saunders Co., W. Washington Sq., Phila. 5, Penna. 1964. Pp. 474. Illus. $10.50. This important new book was prepared under the auspices of the Division of Technical Information, U. S. Atomic Energy Commission. There are more than 1,200 alphabetically arranged entries. Under a table of contents the entries are classified under 15 major headings:- radiation; elements and radioisotopes; radiation biology; genetic effects; somatic effects; prevention and treatment; accidents; radioisotope uses; health protection; environmental contamination; waste disposal; instruments; accelerators, reactors, power; weapons; and administration, laboratories and organizations. It is hoped that in the next edition, where practicable, brief references to further reading may be added at the end of the entry. This valuable reference book is important not only for specialists in atomic energy, but also for biologists, medical researchers, specialists in agriculture, teachers and students, and civil defense and public health officers. Highly recommended.

# THE HUNT ARBORETUM

William Lanier Hunt, *Chairman, Board of Advisors, North Carolina Botanical Garden*

The expanding population in the United States is rapidly causing the destruction of the natural resources of forests and animals. This situation has been coming on rapidly in this century, and, unless the choicest areas are preserved for posterity, they will be swallowed up and destroyed by the present ''population explosion''.

In 1926, I arrived at the University of North Carolina with two truck loads of irises, bulbs and rare plants which I had had with me in Preparatory School at Woodberry Forest, Virginia. I had thought that the Coker Arboretum at the University was an active botanical garden. It turned out, however, to be only a beautiful small collection of native and exotic plants. Since there was not much active botanical and no horticultural work going on in the Arboretum, I betook myself to Europe on a summer study trip.

Anyone who knows Kew Gardens can understand why Kew would inspire a young horticulturist born in a plant nursery to try to establish a botanical garden at home in the wonderful Southern States. Inspired by my old friend, the late Mr. Raffill of the Temperate House at Kew, I came home exhilarated.

Botany students, geologists, zoologists, hiking enthusiasts, faculty members—in fact, almost everybody at the University of North Carolina used to walk to Laurel Hill to see the wild rhododendrons or ''laurels'' when they bloomed in April. On the sides of a deep gorge in a slate valley with Morgan Creek at the bottom, the purple *Rhododendron catawbiense insularis,* trailing arbutus and many, many wild flowers thrive. It has long been known that the fall line slate valleys of the Southeastern States are full of treasures. Mountain species have been noted in them since John Bartram, ''the king's botanist'' and his son William traversed this country in search of the wonders of the ''New World''. Laurel Hill is a splendid example of the slate valley. Many of the mountain species overlap here with those of the Coastal Plain. Rhododendrons grow in sight of Yellow Jessamine (*Gelsemium*), and mountain plants like kalmia, *Azalea arborescens* and fothergillas mingle with coastal species like *Vaccinium arborescens.* The bottom of the gorge is about 260 feet above sea level, and the sides ascend quickly to 350 feet.

It was a case of ''love at first sight'' when I happened upon Laurel Hill on a walk in the woods in 1926. Suddenly, there was a deep valley below me with a musical stream at the bottom almost as big as a river, rushing over rocks and boulders. The site of an old mill, now washed away by a spring freshet, completed the picture of a real mountain valley transported to the eastern edge of the Piedmont.

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Surprised that the University did not own this beautiful and dramatic area, I set about the long and tedious task of acquiring it. After I had searched the country for some seven years for the heirs to the property, the newly discovered heirs proceeded to sue each other for several more! Altogether, more than twenty years elapsed—and a world war—before Laurel Hill was bought and paid for.

The proximity of the Laurel Hill gorge to the campus of the ''first State University'' makes this small area of some 125 acres extremely valuable as a natural teaching laboratory. From the hills above the gorge, one can tell time by ''South bell'', and the Departments of Botany, Zoology and Geology have always used this area for field trips.

Long before I had taken title to Laurel Hill, I had begun to explore its steep sides, often hanging onto trees and shrubs. ''Nothing like this in Kew, Edinburgh, Cambridge or ''Jardin des Plantes,'' I thought. ''Eventually, there will be an arboretum and botanical garden here. . . .'' Shortly after the deed to the property was in hand, I began to open up some trails and roads into the densely overgrown area and to plan its ultimate layout. Then, in 1960, I began to transfer the land to the University as the Hunt Arboretum, to be administered under the new North Carolina Botanical Garden.

Because of its eminent and distinguished faculty, its excellent botanical library and especially because of the presence of the Ashe Herbarium of Southern Plants, the University of North Carolina is a most advantageous place for the establishment of a botanical garden and arboretum. As we have noted, the location near the fall line half way between the mountains and the sea and about half way between New York and Florida allows for the successful cultivation of many plants from colder regions along with those from warmer ones. There is certainly a great opportunity here to create an almost complete living collection of the plants of the Southeastern States.

## BOWLING GREEN STATE UNIVERSITY PLANTARIUM

NATHAN WILLIAM EASTERLY, *Botanist and Plant Naturalist*

Three acres of land have been set aside for the establishment of a Plantarium at Bowling Green State University, Bowling Green, Ohio. As the need arises, more land may be added. It is my hope that we can have a great variety of conifers, deciduous trees and shrubs, and other herbaceous plants of special horticultural interest which are hardy in our area.

Bowling Green is located in a productive farming area of Ohio. During the glacial period, northwest Ohio was covered by Lake Warren. The sandy shores are still evident as sand ridges. As the lake receded, the area remained swampy. Black muck associated with the swamp gave this part of the state the name, ''The Great Black Swamp.'' In 1859, a law providing for public ditches paved the way for drainage of the land. Northwest Ohio today is one of the state's most productive rural areas.

During the past decade there has been a significant increase in our student population. It is my firm conviction that many of these students will become interested in plant life if the necessary facilities are available. Most of these students will not become professional plant scientists but many will become teachers. If a well planned school garden, including greenhouse space, can be established and maintained here at Bowling Green, this will benefit not only the students, but faculty members, other citizens of Bowling Green, or any interested lay person in northwest Ohio.

Any suggestions, help, or encouragement of our plantarium will be greatly appreciated.

## BLANCOA CANESCENS FROM WESTERN AUSTRALIA

W. R. STEVENS, *Bastia Hill, Wanganui, New Zealand*

*Blancoa canescens Lindl.*, a singular member of the *Haemodoraceae* appears to be rare in cultivation, which is rather surprising considering that it is still fairly plentiful in its native habitat. Its home is in Western Australia where it occurs mostly on the sand plains north of Perth, with some isolated colonies quite near Perth.

Lindley named this monotypic genus in honor of a Spanish botanist, Manuel Blanco. In Australia the common name of Red Bugles has been bestowed on it.

Although I have known of this plant for a great many years, I was not able to procure seed of it until three years ago. Only six seeds germinated, and three of them promptly died. The remaining three grew well, and were potted up. At the age of four months, when they were about three inches high, they were planted out in a well-drained sunny position. All of them grew well, and at the age of eighteen months, one plant had a few small flowers, though these were not typical. This year the plants are flowering well.

In growth it resembles some species of *Sisyrinchium,* but the leaves are much coarser and more rigid, growing to a height of about ten inches. Each division or fan is attached to the main root below the soil level, and does not make independent roots. This means that propagation by division is not exactly simple.

The slender furry flower stalks emerge from the fans in March or April (autumn), and buds appear shortly afterwards. These pendent buds are of a rusty red, becoming much brighter as they develop which is very slowly. The number of buds on each stalk varies on each flower stalk from three or four to eight or nine, occasionally up to twelve and are produced in sets of twos and threes. As the flower develops, the six pointed perianth opens out to a horizontal position, showing the pale orange inner colouring. Although not of a spectacular beauty, the slender richly coloured scape is truly charming. The flowering period extends from August (early spring), until the end of October.

It is to be hoped that the Red Bugle flower of Western Australia will gain the wider distribution it deserves, now that seed is becoming available. Interested gardeners may possibly obtain seed from The Director, Botanical Gardens, King's Park, Perth, Western Australia.

[Editorial note.—Under date of Sept. 10, 1963, Mr. Stevens requested information about the relationship of the genus *Blancoa Lindl.*, to other groups. In Kew Index, published in 1895, p. 310, it is indicated as belonging to Family *Haemodoraceae;* and as far as the writer knows no change in its status has been made.—*Hamilton P. Traub*]

## EASILY MANAGED ORCHIDS

A report by J. W. Blowers on easily managed orchids, the various species of *Pleione,* closely related to *Coelogyne,* is to be found in Gardeners Chronicle February 4, 1961, page 94. This beautiful plant may be grown in the cool house, or the coolest position in the intermediate house. *Pleione* formosana, P. Pricei, P. humilis, P. hookeriana, and P. limprichtii, are the hardiest. P. lagenaria, P. praecox, and P. maculata, require a little more heat—about 55°F. The beautiful flowers are produced from winter to spring, and last for about 14 days.

## A BEAUTIFUL BROMELIAD

GRANT V. WALLACE, *Berkeley, California*

The bromeliad in question, *Puya alpestris,* sometimes known as *Pitcairnia caerulea,* was given to me by the late Mrs. Anson Blake, who had a lovely estate and botanic garden in Berkeley, since taken over by the University of California. The plant is rugged and hardy, a native of the Andean slopes of Chile. It has bloomed but twice in my experience, eight years apart: once in July, 1955; and at the time of writing, August, 1963. It is well worth waiting for. The flower stem resembles that of a yucca; the whole plant has a yucca-like habit, for that matter. The infloresconse is a many-branched spike, with the lovely flowers opening from the bases of the spikelets upward. The perianth consists of three conspicious, colored segments, with the other three short and obscure, resembling a calyx. The color is a hard-to-describe green, somewhat like verdigris. Each flower has a little pool of clear nectar within its base; I tasted this liquid and found it to have a very pleasant, faintly sweet flavor. I can't recommend the plant for quick results, but it is a sight to behold when it finally decides to unfurl its inflorescence!

## ANTHOLYZA BREEDING PROGRAM

HAMILTON P. TRAUB

When the writer moved to La Jolla on the Pacific Ocean, he found on the grounds a naturalized South African irid which appears to be *Antholyza intermedia.* He also noted that it was naturalized or cultivated in gardens elsewhere in the vicinity. At first he tolerated it but also eradicated some of it, but as he observed it over an eight year period he finally began to appreciate its value. It flowers profusely in January—March, has a very informal character that makes it valuable in flower arrangements, and thrives under utter neglect. It dies down in June at the beginning of the 3—4 months dry period, and emerges with the rains in October, and then blooms from January to March. The flowers are bright red. It seeds profusely so that it can be easily propagated either by seeds or by offset-cormlets. In 1962, the writer decided to begin a breeding project to improve this subject still further, but there are no other species available here at present. There are about 18 species—4 in tropical and the rest in South Africa.

For the breeding program, the following are wanted particularly, although any of the other species would be acceptable—*namaquensis* (red), *nervosa* (scarlet), *pulchra* (violet-purple), *cunonia* (red), *aethiopica* (red and yellow), *aethiopica* var. *bicolor* (red and primrose), *aethiopica* var. *vittigera* (orange-red), *paniculata* (red and yellow), *quadrangularis* (red and yellow), *steingroveri* (red), *schweinfurthii* (red and yellow) and *bucherveldii* (greenish-yellow). Seeds and corms of *A. intermedia* are available at present for exchange. It is known that it is particularly useful for southern California, and it may be that it will thrive also in southern Arizona, Texas, Louisiana, Mississippi, Alabama and Florida.

## ROOT MEALYBUGS ON PHOENIX AND CORDYLINE

HAMILTON P. TRAUB, *California*

When the writer took possession of his home at La Jolla, Calif., in 1954, the grounds were literally overrun with giant *Eucalyptus* and in addition there were two large *Phoenix dactylifera*. All of these, as reported by neighbors had been planted by a nurseryman friend of Lew Ayres on the premises at the time his parents built the house. The *Eucalyptus* were removed at an expense of $800 and one of the *Phoenix dactylifera* was allowed to stand. It was soon found however that the roots of the palm had literally penetrated the ground for a radius of over 30 or more feet, and to a considerable depth. It was also found that *hardly anything could compete* with the roots of the palm. Also he was shocked to note that the roots were infested with mealybugs which appeared not to harm the development of the palm. Thus the palm had to be removed. In southern California such palms, and also *Washingtonia* palms, and others, serve as homes for rodents. When the *Phoenix* was removed, it was difficult to drive off the huge rats that it housed; one very large rat simply moved to the other side when workmen were busy on one side.

In this connection the writer remembered that when he resided at Orlando, Fla., in the 1930's and 1940's, it was proposed to organize a palm society. The writer noted that palms were hardly subjects for the intimate gardener, mainly due to the great size of many palms, and that their culture was best reserved for large parks and plantariums (arboreta). Someone suggested instead that the American Amaryllis Society be organized, and this proposal luckily prevailed.

The writer ordered stock of what is locally known as the Ti plant in Hawaii, which is *Cordyline terminalis* from tropical Asia. This thrived here and soon became so luxuriant as to become a nusiance. Ti also harbors the root mealybugs which do not seem to harm it. Thus it too had to be eradicated.

It would be of interest to hear from other members who have had similar troubles.

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## FILMSTRIP SERIES: PLANT CLASSIFICATION

[The following excerpts are from a letter received July 6, 1962 from Dr. Winslow Kelley, Associate in Filmstrip Production, Encyclopedia Britannica Films, Inc., Wilmette, Illinois. Those interested in this cooperation should write directly to Dr. Kelley.]

It occurred to us here at Encyclopaedia Britannica Films that members of the American Plant Life Society may have in their files some excellent 35 mm color slides which could be of value for teaching young people more about botany in numerous high school classes throughout the country.

For your information, we plan to release a series of nine science filmstrips on PLANT CLASSIFICATION to the nation's high schools, this autumn. For this program we will be able to utilize 35 mm color slides for the illustrations. The subject areas for these filmstrips are:

How Plants Are Classified
Algae
Bryophytes
Fungi and Slime Molds
Bacteria
Ferns and Fern Allies
Gymnosperms
Monocotyledons
Dicotyledons

Professors Howard Arnott and Robert Doyle, botanists at Northwestern University, are the educational collaborators for this series.

Since the filmstrips will be distributed to high school biology teachers, we plan to present an over-view of the typical plants in the primary groupings. Professors Arnott and Doyle have prepared the attached list of some of the visuals still needed. Even so, if you or a member have a slide that is not identical to one requested but is closely related, substitutions will be given careful consideration.

If you or members in the Plant Life Society would be interested, we would appreciate it if 35 mm color slides on any of the subjects listed could be forwarded to us; we will purchase those accepted at $10 per slide. In addition to the $10, we will supply a duplicate of each slide purchased. Of course, those slides not used will be returned. Each slide submitted should be well identified either on the slide or on a separate identification sheet.

[For those members interested in the amaryllids, it should be noted that these are included under the heading "Monocotyledons."
—*Editor*]

## PLANT LIFE LIBRARY

STUDIES IN GENETICS, by H. J. Muller. Indiana University Press, Bloomington, Indiana. 1962. Pp. 618. $4.95. Geneticists in particular and indeed all biologists are fortunate that two of the pioneer contributors, and distinguished elder statesmen in these disciplines have consented to republish their more important papers in single volumes. Prof. E. B. Lewis has assembled and edited the works of Prof. A. H. Sturtevant. Likewise, at the instigation of his students and colleagues, and on the occasion of his seventieth birthday, Prof. H. J. Muller has selected and edited the papers in the volume under review. He has also clarified certain obscurities by inserting a number of explanatory notes at appropriate spots in the text.

The papers are segregated into 9 parts; each part represents work that is roughly homogeneous in subject matter. They are: (1) Chromosome basis of heredity and linkage; (2) Genotype-phenotype relations; (3) Gene theory; (4) "Spontaneous" gene mutations; (5) Gene mutations induced by radiation; (6) Chromosome properties and changes; (7) Heterochromatin; (8) Evolution; (9) Human and general genetics.

There is a FOREWORD by Joshua Lederberg; a page devoted to "H. J. MULLER AS A TEACHER" by G. Pontecorvo; and a chronological list of "WORKS BY H. J. MULLER" which runs to 336 titles, truly a prodigious output by any set of standards. There is also an INDEX of about 8 pages. A random sample of several entries in the INDEX suggests it is accurate and usable.

Browsing thru the pages of this book, one cannot help but be impressed, or even overwhelmed, by Prof. Muller's fertile imagination, and capacity to design critical experiments. These are his most outstanding characteristics as pointed out by Pontecorvo in his essay on Muller as a teacher. It is also true as Lederberg states in the FOREWORD that Prof. Muller has had the foresight and skill to anticipate nearly all of the major advances in genetics over the past 30 years. This is truly an amazing feat in a dynamic science such as genetics has proved to be in the 60 years of the twentieth century.

Prof. Muller takes a dim view of the idea currently fashionable in some circles that all biological problems can be solved by biochemical and biophysical methods and techniques. In his opinion the methodologies and materials of classical genetics are clearly not passé. In a bold statement quoted below, Prof. Muller makes his position clear.

"We do not wish to imply by the above remarks any agreement on our part with the adolescent notion that genetic work utilizing the older methods and materials is no longer worthwhile. There are enormous areas of great importance still to be explored that cannot at present be inquired into as well in any other way, and that promise rewarding results. Included here are work on mechanisms of segregation, crossing over, mutation, position effect, gene expression, selection, and speciation, and analyses of differentiations within chromosomes and within 'loci'."

His fellow geneticists and future generations of geneticists and biologists have reason to be grateful to Prof. Muller for making available in one volume the fruits of a lifetime of research. Lastly, the Indiana University Press deserves congratulations for publishing a book of slightly over 600 pages that can be purchased for the price of $4.95.—*Thomas W. Whitaker.*

KURZE GESCHICHTE DER GENETIK BIS ZUR WIEDERENTDECKUNG DER VERERBUNGSREGELN GREGOR MENDELS [A short history of genetics up to the rediscovery of Gregor Mendel's laws] by Hans Stubbe, Gatersleben, Veb Gustav Fischer, Verlag, Jena. 1963. pp. 232. DM 18.10. Illus. Contrary to expectation there is no really good early history of genetics in the German language. This state of affairs no longer exists. Prof. Dr. Hans Stubbe, the able and respected Director of the Institutes für Kulturpflanzenforschung at Gatersleben, East Germany, has effectively closed this gap. His short history of genetics is an excellent chronicle of the early history and development of the science of heredity. Prof. Stubbe's book covers approximately the same material and time span as Conway Zirkle's "The beginnings of plant hybridization", combined with his later paper. "The knowledge of heredity before 1900". The book by Prof. Stubbe is more comprehensive than Zirkle's work because it traces developments in both plant and animal fields.

Prof. Stubbe commences his story with the domestication of animals and plants, and terminates it with a detailed, documented study of the personalities and events leading to the rediscovery of Mendel's laws in 1900. In the intervening pages he evaluates the contributions of the Greeks, the Romans and the outstanding natural history investigators of the Middle Ages. In the eighteenth century he explores the ideas and personalities responsible for the preformation theory, the theory of epigenesis and the great botanical discoveries made at the end of the seventeenth and beginning of the eighteenth centuries. The remainder of the book is devoted to the work of individuals whose investigations indirectly led to establishing a firm foundation for the recognition of the significance of Mendel's work when it came to light in 1900.

It is a scholarly book with much detailed historical information to offer the serious student of heredity. Among its most pleasant features are the excellent portraits of many of the individuals involved in the slow but steady climb of genetics from an art to a full-fledged scientific discipline. The portraits range from that of the Greek physician, Hippocrates, to the Austrian geneticist, Erich von Tschermak-Seysenegg. There is a bibliography of about 400 titles, and both a subject and author index.—*Thomas W. Whitaker.*

THE ARCHITECTURE OF THE GERMPLASM by Verne Grant, John Wiley & Sons, Inc., New York. 1964. pp. 236. $9.75. Illus. If we accept the dictionary definition of "architecture" as any ordered arrangement of the parts of a system, the title of this book is technically correct. An even more descriptive title might be, "Gene action and interaction in diploid organisms". The book is predominantly about genes, their linkages, interaction with other genes and with the environment. Within the limits he has set for himself, Prof. Grant has done a magnificent job of analysis to show just how genes are arranged and how they perform to execute their many functions. Admittedly the term "gene" is hard to define satisfactorily in terms of a precise well-marked entity on the chromosome. Grant takes the attitude the term is still a useful one. He states, "It (the gene) can only be used in an indefinite sense to refer to genetically active regions of varying size and limits on a chromosome."

Later in the book Grant suggests that the true theory of the gene will have to be established by future research, and will probably consist of a composite of several different generalizations, each with limited validity. This position is well summarized by the following quotation, "Thus the genetic material of viruses and bacteria may consist to a considerable extent of interchangeable nucleotide pairs, while that of plants and animals may be organized to a much greater extent into large structural units. In short, discrete Mendelian genes may be a characteristic element in the genotype of complex organisms, but may be a relatively uncommon feature of the genotype of simple viruses and bacteria."

Considering that the book is aimed at an audience of advanced biology students and professional biologists, one might question the propriety of including the elementary material of the first two chapters, "The Hereditary Material" and "Gene Action". Similar discussions can be found in many of the modern textbooks of genetics. As Grant points out, however, this basic material is needed for an orderly development of the analysis which follows.

It is difficult to find much to quarrel with in this book. The final 4 chapters are particularly good: "Organization of a Chromosome Region"; "Linkage of Functional Gene Systems, I"; "Linkage of Functional Gene Systems, II"; and "Linkage of Adaptive Gene Combinations". Prof. Grant has made an effort, largely successful, to avoid technical terms, but in the end he is forced to coin a few himself, e.g. serial gene systems, etc. However, one should not be misled into thinking this is a book for a casual evening's entertainment. Close attention and study are required to follow the author's skillful, tightly knit arguments.

Prof. Grant is not one of those people who think that genetics commenced in 1953 when Watson and Crick announced the probable structure of the DNA macromolecule. He has borrowed freely from earlier literature for examples that are pertinent for his purpose. The work of Goodspeed and Avery with trisomics in *Nicotiana* is used to illustrate genic balance. Likewise, to show the differences between closely related species in the segmental arrangement of chromosomes, Avery's work with *N. alta, N. langsdorffii* and *N. bonariensis* is cited. These researches were all published in the late 1930's.

In a section on "hereditary determinants in the cytoplasm", Grant devotes about 4 pages to a succinct account of the important research of Michaelis with *Epilobium*. This work has been either ignored or not well-understood by most contemporary writers. It is a welcome surprise to see it integrated with other research on the nature of the hereditary factors in the cytoplasm.

The book is neatly assembled and printed. Moreover, it is practically free of typographical errors. The bibliographical footnotes are an unusual and convenient feature of the book. They do away with annoyance of having to turn to the end of the chapter or the rear of the book to check the author's documentation. There is a Bibliography of about 250 titles, an Author and a Subject Index—*Thomas W. Whitaker*

DIE GENOMMUTATIONEN (PLOIDIEMUTATIONEN), by Dr. Rigomar Rieger. Gustav Fischer Verlag, Jena. 1963. pp. 183. DM, 23.90. **Die Genommutationen (Ploidiemutationen)** is another excellent review in the series, **Gundlagen, Ergebnisse und Probleme der Genetik,** edited by Professor Dr. Hans Stubbe of Gatersleben, East Germany. Rieger has centered this review mostly around a discussion of the origin of polyploids and the mutations that occur in these organisms with extra chromosomes. Naturally, nearly all of the examples chosen for discussion are from the higher plants, because this is where polyploidy commonly occurs, and where it can be readily induced for experimental study. There is, however, some discussion of polyploidy in salamanders, and of aneuploidy in man. **Die Genommutationen** is a very thorough, well-illustrated review of 183 pages. There is a bibliography of nearly 500 titles and an author-subject index.—Thomas W. Whitaker.

GENETICS, by I. H. Herskowitz. Little, Brown and Company, 34 Beacon St. Boston 6, Mass. 1962. Pp. 466 plus 76 pp. Supplement, Illus. Professor Herskowitz's text is patently one of the best of the current crop of college textbooks on modern genetics. If the author's directions are followed it can be used for either a one semester course (31-45 hours) or a two semester course (60-90 hours). For the one semester course he suggests omitting about one-half of the material leaving only the chapters on basic concepts to be mastered.

It is an attractive book; the paper, printing, and binding are good, and the illustrations appear to have real merit. Few typographical errors are apparent. There is both a SUBJECT INDEX and an AUTHOR INDEX, along with a SUPPLEMENT. The first paper in the SUPPLEMENT is a portion of Mendel's letter of 1867 to Carl Nägeli reporting the results of his classical experiments with peas. The remainder of the material consists of Nobel Prize lectures by Morgan, Muller, Beadle, Tatum, Kornberg and Lederberg. These inspiring addresses are of lasting value, and the serious student of genetics could well take the time to study and digest them.

The author, evidently an experienced teacher, has introduced some sound pedagogical tools each calculated to stimulate the learning process. For example, each chapter terminates with a short paragraph or two, appropriately labeled SUMMARY AND CONCLUSIONS which epitomizes the essential ideas developed in the preceding pages. Also at the end of each chapter there is a list of thought provoking QUESTIONS FOR DISCUSSION, and 4 to 6 REFERENCES to original papers from which the material in the chapter was drawn. Another lively innovation is a photograph of an individual who has made significant contributions to the field covered by the chapter. It is a pleasant surprise to note that more than one half of these persons are alive today.

In 49 chapters Professor Herskowitz has covered the entire field of genetics from segregation to genetic coding. Inevitably some subjects are given more thorough treatment than others. The text appears to be well adapted to satisfy the needs of those students majoring in science. Whether it would be suitable for liberal arts students with a limited background in chemistry and biochemistry is questionable. Also, as the author admits, the vast field of applied genetics has been almost entirely neglected.—*Thomas W. Whitaker*

A SOURCE-BOOK OF BIOLOGICAL NAMES AND TERMS, 3rd edition, revised and enlarged, 3rd Ptg., by E. C. Jaeger. Chas. C. Thomas, 301-327 E. Lawrence Av., Springfield, Ill. 1962. Pp. xxxv + 323. Illus. $5.75. Since the publication of the 3rd edition in 1955, the supplement to this standard work has been considerably enlarged. In the introductory section, the building of names and terms, types of names, application of names, transliteration, Greek prefixes, form of Latin nouns and adjectives, Latin names of anatomical structures, and language abbreviations, are considered. In the main body of the book, and supplement, the Greek, Latin, or other origins of the more than 12,000 elements included are set down alphabetically. Their meanings together with examples of their use in nomenclature and terminology, are concisely given. This is required as a standard reference book by students, teachers, and all other workers in the biological sciences. Highly recommended.

BIOLOGY TEACHER'S HANDBOOK, by J. J. Schwab, supervisor. John Wiley & Sons, 605 3rd Av., New York 16, N. Y. 1963. Pp. 585. Illus. $7.00. This is one of the series of Biological Sciences Curriculum Studies initiated by the American Institute of Biological Sciences. Thirteen authorites participated in this study and the results are summarized by the supervisor. It is intended as an everyday reference source for those teaching the Biological Sciences Curriculum Study courses, and also for those teaching other biology courses. Section 1 is devoted to the method of approach; Section 2, to the demonstration of the teaching of biology by inquiry; Section 3, to basic knowledge in the physical sciences and statistics, and recent biochemical discoveries, necessary for teaching biology; and Section 4, to information and materials which assist the teacher. This is required reading by all biology teachers, and should be on hand for daily reference. Highly recommended.

FATTY ACID METABOLISM IN MICROOGANISMS, by Klaus Hofmann. John Wiley & Sons, 605 3rd Av., New York 16, N. Y. 1963. Pp. 78. Illus. $3.25. This is a summary of the work carried on by Dr. Hofmann at the University of Pittsburgh in 1947 which was presented as the 1962 Squibb Lectures on Chemistry of Biological Products. Chapter 1 deals with lactobacillic acid, a novel microbiological metabolite; Chapter 2 is devoted to biosynthesis of cyclopropane fatty acids, and Chapter 3 is concerned with biosynthesis of monounsaturated fatty acids by microoganisms. Highly recommended.

NAMING THE LIVING WORLD, by Theodore Savory. John Wiley & Sons, 605 3rd Av., New York, 16, N. Y. 1963. Pp. 128. Illus. $3.95. This well-written, easily readable book is designed for the student in biology who desires to obtain an understanding of the principles and procedures for the naming of lineages (species and higher taxa). Part 1 is devoted to the principles of nomenclature; Part 2, to the various codes of nomenclature; and Part 3, to the practice of nomenclature—the naming of species and higher taxa.

QUANTITATIVE CHEMICAL TECHNIQUES OF HISTO- AND CYTOCHEMISTRY. Vol. 2. Interscience Publ. (Div. of John Wiley & Sons), 605 3rd Av., New York 16, N. Y. 1963. Pp. 513. Ilus. $15.75. This is the second volume in the series by Dr. Glick. The reader is referred to the review of Vol. 1 in Plant Life, vol. 19. 1963. The second volume is devoted primarily to chemical techinques—spectrophotometric and titrimetric techniques—but flame photometric, and microbiological techniques are also included. This up-to-date text is required as a constant reference companion by all who are interested in histo- and cytochemistry. It is highly recommended.

OUTLINES OF BIOCHEMISTRY, by E. E. Conn and P. K. Stumpf. John Wiley & Sons, 440 Park Av., So., New York 16, N. Y. 1963. Pp. 391. Illus. $8.75. This outstanding new one semester course in biochemistry for upper-division undergraduates and first-year graduate students, by two authorities, will be welcomed by both the teacher and the student. It provides an excellent over-all survey of the science of biochemistry in the light of recent advances in our knowledge. Part 1 deals with the chemistry of biological compounds; Part 2, surveys the metabolism of biological compounds; and Part 3, is concerned with integration of metabolism. Appendices are devoted to buffer and pH problems; a review of some modern concepts in organic chemistry; and methods in biochemistry. The authors are to be congratulated on an excellent text. It is highly recommended.

THE CHEMISTRY OF WOOD, edited by B. L. Browning. Interscience Publ. (Div. of John Wiley & Sons), 605 3rd Av., New York 16, N. Y. 1963. Pp. 689. Illus. $25.00. This important new text by 17 authorities, includes contributions on the outstanding features of the chemistry of wood, and its components. It is intended for the student, the young scientist and technologist. It provides critical surveys of the supply and uses of wood; structure of wood; composition and chemical reactions of wood; cellulose; hemicelluloses; wood lignins; extraneous components of wood; chemistry of developing wood; wood-water relationships; manufacture of wood pulp; wood as a chemical raw material; and chemistry of bark. This contribution is both a text and a reference book and is highly recommended.

ADVANCES IN ENZYMOLOGY, AND RELATED SUBJECTS OF BIOCHEMISTRY, edited by F. F. Nord. Vol. 25. Interscience Publ. (Div. John Wiley & Sons), 605 3rd Av., New York 16, N. Y. 1963. Pp. 565. Illus. $15.00. This volume includes contributions from 15 outstanding authorities. The topics covered include elementary steps in enzyme reactions; photosynthesis, energetics and related subjects; the chemistry of light emission, the prevelance and significance of the products; inhibition of enzymes; coenzyme Q; multiple forms of enzymes; biological basis for ethionine effects on tissues; biological methylation; recent developments in the biochemistry of amino sugars; and the mechanism of cacao curing. This important volume is highly recommended to all who are interested in enzymology.

ADVANCES IN PEST CONTROL RESEARCH, edited by R. L. Metcalf. Vol. 5. Interscience Publ. (Div. John Wiley & Sons), 605 3rd Av., New York 16, N. Y. 1962. Pp. 329. Illus. $13.50. This volume includes contributions from 6 outstanding authorities in the field of pest control. The articles are devoted to the impact of antibiotics upon plant disease control; theory and principles of soil fumigation; fumigation of food commodities for insect control; gas chromatography of pesticides; and instrumentation in pesticide residue determinations. This timely book will be of interest to all who are interested in advances in the basic knowledge of plant and animal pests, and measures for their control. Highly recommended.

PROCEEDINGS OF THE FOURTH CELLULOSE CONFERENCE, edited by R. H. Marchessault. Interscience Publ. (Div. John Wiley & Sons), 605 3rd Av., New York 16, N. Y. 1963. Pp. 548. Illus. $22.50. This symposium includes contributions from a large number of authorities in the Cellulose Research Institute. It is notable that a half-day session was devoted to the molecular architecture of wood. According to prominent workers in this field, the future of cellulose as a polymeric entity is locked in the molecular complexity of wood. In addition, there are general papers on various topics usually considered at the conference; discussions on future trends in cellulose research; and contributions from friends and colleagues of P. H. Hermans. Highly recommended.

HEREDITY AND DEVELOPMENT, by J. A. Moore. Oxford Univ. Press, 417 5th Av., New York 16, N. Y. 1963. Pp. 245. Illus. (Paperback) $1.95. In the first part of the book, the history of genetic concepts is traced from Darwin's untenable theory of pangenesis of 1868, to the rediscovery of Mendelism in 1900, and finally to the identification of nucleic acid with the genetic code. In the second part—concerned with embryology—the carrying out of the hereditary instructions contained in the zygote is discussed. The subject is amplified by the consideration of a synopsis of development of the amphibian embryo; gastrulation and organ formation; differentiation; and developmental control of genetic systems. This stimulating book is highly recommended.

CHROMATOGRAPHY, edited by Erich Heftmann. Reinhold Publ. Corp., 430 Park Av., New York 22, N. Y. 1961. Pp. 753. Illus. $17.50. This first complete reference book on the theory, techniques and applications of chromatography and electrochromatography will be welcomed by all chemists and biologists. The book includes contributions from thirty-four outstanding authorities. The first part is devoted to fundamentals of chromatography including the development of theories and techniques. Part 2 is concerned with the applications of chromatography to important classes of compounds—amino acids, peptides, proteins, lipids, terpenes, carotenoids, fat-soluble vitamins, steroids, carbohydrates and related compounds, alkaloids, nucleic acids and related substances, chlorophylls and porphyrins, water-soluble vitamins, antibiotics, phenols, inorganic ions, nonhydrocarbon gases, and hybrocarbons. This important reference text is highly recommended to teachers and students; and chemists and biologists.

VIEWPOINTS IN BIOLOGY, NO. 1. Edited by J. D. Carthy and C. L. Duddington. Butterworth Inc., 7235 Wisconsin Av., Washington 14, D. C. 1962. Pp. 290. Illus. $14.95. It is refreshing to note that the series of reviews, of which this is the first, are to be written so as to be "readily understandable to other scientists as well as biologists." In this first volume, comprehensive reviews are presented by H. E. Street, on the physiology of roots; P. R. Lewis, on histochemistry in biology; H. Tristram, on protein synthesis in micro-organisms; C. L. Duddington, on predaceous fungi and the control of eelworms; J. E. Treherne, on the physiology of absorption from the alimentary canal in insects; and, Gabriel Horn, on some neural correlates of perception. This important volume is highly recommended to biologists.

THE BOXWOOD BULLETIN, Vol. 1, Nos. 1—3; Vol. 2, nos. 1—4. (1961-1962). The American Boxwood Society, Blandy Farms, Boyce, Va. Membership $2.00 per annum; Bulletin to non-members, $5.00 per volume. This quarterly is devoted to boxwood, the oldest garden ornamental. This publication will appeal to the large number of gardeners who are interested in boxwood.

LIFE: ORIGIN AND DEVELOPMENT, by Goesta Ehrensvaerd. Univ. of Chicago Press, 5750 Ellis Av., Chicago 37, Ill. English edition. 1962. Pp. 164. Illus. $1.50. This book, by an outstanding Swedish biochemist, presents his ideas about the origin of living things through gradual chemical evolution. He apparently discounts the role of chance in the evolutionary process, and holds that there is an inevitable path. However, the truth apparently lies somewhat between these two extremes. This presentation is recommended to the student as the conclusions reached by an eminent biochemist which are worthy of consideration.

THE ECOLOGY OF NORTH AMERICA, by V. E. Shelford. Univ. of Illinois Press, Urbana, Ill. 1963. Pp. 610. Illus. $10.00. This important book details an ecological reconstruction of early North America (1500 to 1600) on the basis of widely scattered published works dealing with these primeval communities, and also data collected by the author during a lifetime of field observation and research. Its publication is indeed an important event because it provides background information on the habits, biotic communities, and distribution and abundance of animals and plants in primeval North America. This outstanding book will appeal to plant and animal biologists, agriculturists, foresters, wildlife managers, and sportsmen. Highly recommended.

MOLECULAR EQUILIBRIUM, by P. H. Carnell and R. N. Reusch. W. B. Saunders Co., W. Washington Sq., Philadelphia 5, Penna. 1963. Pp. 217. Illus. Paperback, $2.25. This is a programmed course in general chemistry. The authors point out that such a course is not a substitute for regular class-room instruction, but when properly used in conjunction with the other teaching procedures, it can be of real assistance to the student. The course is in three parts—the law of chemical equilibrium; equilibrium changes; and equilibrium calculations. Highly recommended to chemistry students.

(CONTINUED on page vi, above.)

# THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

## I. THE AMERICAN AMARYLLIS SOCIETY

[Affiliated with the American Plant Life Society]

[AMERICAN AMARYLLIS SOCIETY, continued from page 2.]

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## III. PUBLICATIONS OF THE AMERICAN PLANT LIFE SOCIETY

### BOOKS

1. **AMARYLLIDACEAE: TRIBE AMARYLLEAE**, by Traub & Moldenke (including the genera Amaryllis, Lycoris, Worsleya, Lepidopharynx, Placea, Griffinia, and Ungernia; Manila covers; 194 pages, incl. 18 illustrations. $5.00 postpaid.

This is required reading for every amaryllid enthusiast.

**2. DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893—1948,** by Norton, Stuntz, and Ballard. A total of 2695 Hemerocallis clones are included and also an interesting foreword, and explanatory section about naming daylilies. Manila covers; 100 pages (1—X; 1—90), includes a portrait of George Yeld. $2.50 postpaid.

**3. THE GENERA OF AMARYLLIDACEAE,** by Hamilton P. Traub. Includes a general introduction, a key to the subfamilies, infrafamilies, tribes, subtribes and genera of the Amaryllidaceae, and brief descriptions of all the genera. Manila covers; publ. 1963; 85 pages. $5.00 postpaid.

## PERIODICALS

**(A) HERBERTIA [First series,** 1934 to 1948, incl.], devoted exclusively to the amaryllids (Amaryllidaceae), and the workers concerned in their advancement. A complete set of these volumes is indispensable to all who are interested in the amaryllids. Libraries should note that this may be the last opportunity for complete sets.

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Dr. Thomas W. Whitaker, Executive Secretary,
The American Plant Life Society,
Box 150, La Jolla, Calif.

# CATALOG OF
# HYBRID AMARYLLIS CULTIVARS
# 1799 TO DEC. 31, 1963

COMPILED BY

Dr. Hamilton P. Traub
Prof. W. R. Ballard
Mrs. La Forest Morton
Mr. W. D. Morton, Jr.
Mr. E. F. Authement

FIRST EDITION

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# FOREWORD

The registration of Hybrid *Amaryllis* clones began with the organization of the AMERICAN AMARYLLIS SOCIETY in 1934. In the same year the writer published the first catalog of Hybrid *Amaryllis* in THE AMARYLLIS YEAR BOOK. Since 1934, the Society has provided a registration service, international in scope, for *Amaryllis* and the other amaryllids.

During the 1940's the responsibility for the registration of hybrid *Amaryllis* clones was assumed by Prof. W. R. Ballard of Hyattsville, Maryland. When Prof. Ballard died in the 1950's, the post was vacant until the duties were taken over by Mrs. La Forest Morton of New Orleans, Louisiana, who ably handled the project until her death on Oct. 28, 1955. Mr. W. D. Morton, Jr., had assisted his wife in the registration and other work that Mrs. Morton had carried on as an officer of THE AMERICAN AMARYLLIS SOCIETY, and it was natural that he should continue the registration project, and he has headed up the project since that date. In 1962, Mr. Edward F. Authement accepted the position of Assistant Registrar in order to assist Mr. Morton with the project. With this additional assistance, it was decided to prepare the present CATALOG OF HYBRID AMARYLLIS CULTIVARS. Mr. Authement performed the major part of the work in connection with the compilation of the Catalog from the records left by the previous registrars.

The first Amaryllis hybrid was made by a Mr. Johnson, who had a small garden at Prescot, Lancastershire, England. The hybrid was reported in 1799. It was a cross between *Amaryllis reginae* and *A. vittata*, and was later named *Amaryllis* x *johnsonii*. This, or similar hybrids, has come down to us. During the first third of the 19th century, many hybrid *Amaryllis* had been produced, mainly in England.

Hybrids in the contemporary sense were first produced by Garroway & Company, of Bristol, England, who originated *Amaryllis* x *acramannii* in 1835 by crossing *Amaryllis aulica* var. *platypetala* and *A. psittacina*. This hybrid has come down to us and is still cultivated in the United States.

The second important step in the development of the larger-flowered hybrids was realized when Jan de Graaff (1797—1862) crossed *A. vittata* with *A. striata* vars. *fulgida* and *crocata*, and by selective breeding obtained the colorful hybrid which was named 'Graveana'.

His son, Simon de Graaff (1840—1911) in the 1860's crossed *A. psittacina* and *A. striata* with other available larger-flowered hybrids, and then crossed these with 'Graveana', and thus produced the famous 'Empress of India', with glowing red flowers and broad, rounded, white-banded telapsegs. This represented the third landmark because it was the beginning of the large-flowered Reginae hybrids represented today by Division 4-A and 4-B Reginae flower types.

The fourth step in the direction of the contemporary hybrids was taken when Richard William Pearce was employed by Veitch & Sons to collect plants in South America. He brought back *Amaryllis* *leopoldii* and *A. pardina* from Peru (possibly actually from Bolivia). These were crossed with the best Reginae hybrids and by the 1870's gave rise to the large-flowered, open-faced Leopoldii hybrids. These are recognized today as Division 5-A and 5-B Leopoldii Hybrids.

The contemporary hybrids contain genes not only of the species mentioned but also of a number of others—a total of more than a dozen species.

With the organization of THE AMERICAN AMARYLLIS SOCIETY in 1934, steps were taken to extend the variety in cultivated hybrid *Amaryllis.* In addition to Reginae Hybrids (Division 4-A and 4-B), and Leopoldii Hybrids (Division 5-A and 5-B), the following new Divisions were recognized: Division 1 (cultivated wild species); Division 2 (Long Trumpet Hybrids), Division 3 (Belladonna Hybrids), Division 6 (Orchid-flowering Hybrids), Division 7 (Double Hybrids), Division 8 (Miniature Hybrids) and Division 9 (Unclassified Hybrids). Some progress has been made toward popularizing these additional types which add much needed variety.

Since 1799, a very great many *Amaryllis* hybrids have been produced and named. Of these, up to 1934, only a very few had survived. It would thus serve no useful purpose to attempt to catalog all of these names of non-existent clones. It was decided to list only those names which had appeared in major works concerned with *Amaryllis.* Such a catalog was prepared by the present writer and published in the 1934 AMARYLLIS YEAR BOOK. Beginning with this date, an attempt was made to catalog at least the named clones in commerce. These names were listed as registered in the AMARYLLIS YEAR BOOK. The present Catalog includes these names and those registered up to December 31, 1963. This work is to be considered as *the starting point* for the nomenclature of hybrid *Amaryllis* cultivars.

Supplements to the present Catalog will be issued from time to time, listing those named clones in cultivation. Thus, those interested may keep up with developments by consulting the 1964 Catalog, and the most recent supplement.

*Camino de la Costa,*
*La Jolla, California*
*Decembed 31, 1963*

*Hamilton P. Traub,*
*Editor*

## CORRIGENDA

Any needed corrections in the CATALOG will be reported in PLANT LIFE 1965.

# HOW TO REGISTER AN AMARYLLIS CLONE

The registration service, international in scope, was instituted by The American Amaryllis Society in 1934.

1. Write to the Registrar of *Amaryllis* cultivar names, Mr. W. D. Morton, Jr., 3114 State Street Drive, New Orleans 25, La.; or Mr. Edward F. Authement, Assistant Registrar, 2214 Gallier Street, New Orleans, La. 70117, for registration blanks, enclosing check or money order for the registration fee made payable to THE AMERICAN AMARYLLIS SOCIETY, which is affiliated with THE AMERICAN PLANT LIFE SOCIETY.

2. The registration fee is $2.00 for each clone registered. The brief description of the registered clone will be published in the next following AMARYLLIS YEAR BOOK.

3. A name not previously used should be selected, and this together with an alternate name that may be substituted in case the first has already been pre-empted. The present Catalog contains all of the names pre-empted through 1963. If it does not appear there, or in any Supplement published later, the chances are that it is available unless some one has recently sent in an application with a request for it. The registration is not completed until the blanks are filed and approved by the Registrar. A signed registration form will then be returned to you.

4. The registration procedure is in essential accordance with the International Code for Cultivated Plants, 1961 or later editions. Names should consist preferably of one or two words, and never of more than three words. The following types of names are inadmissible:

(a) Scientific or common names of a genus, or the common name of a species; such as 'Hibiscus', 'Camellia', 'May Apple', etc.
(b) Numerals or symbols such as seedling numbers, etc.
(c) Names beginning with articles, such as "The" and "A".
(d) Names of living persons without the written consent of that person, or of the parents, in case of a minor.
(e) Abbreviations such as "Dr." for "Doctor", "Mt." for "Mount", etc.
(f) Use of trademark or copyrighted names unless previously in common use. Or a slight variation of a name already registered

5. The application blank should be filled in as completely as possible. It is particularly important to include (a) the flower type Division, (b) the height of the plant; (c) number of flowers per umbel; (d) depth of flower; (e) diameter of the flower; (f) brief color description of flower; (g) flowering time; (h) deciduous or evergreen habit of plant.

6. The classification of the Amaryllis flower types are those which appear in Traub, "The Amaryllis Manual". Macmillan Co., New York & London, 1958:

Division 1. Cultivated Wild Amaryllis (D-1)
Division 2. Long-Trumpet Amaryllis Hybrids (D-2)
Division 3. Belladonna-Type Amaryllis Hybrids (D-3)
Division 4. Reginae-Type Amaryllis Hybrids (D-4) (sub-types D-4A, and D-4B)
Division 5. Leopoldii-Type Amaryllis Hybrids (D-5) (sub-types D-5A, and D-5B)
Division 6. Orchid-Flowering Amaryllis Hybrids (D-6)
Division 7. Double Amaryllis Hybrids (D-7)
Division 8. Miniature Amaryllis Hybrids (D-8)
Division 9. Unclassified Amaryllis Hybrids

7. Introduction of hybrid Amaryllis clones: Introduction is defined as the ''offering for sale to the public'' in catalogs, printed lists, and advertisements. Send copies of these, if they contain new introductions, to the Registrar, if possible.

8. Only registered named clones, and authentic unnamed breeder's seedling, are eligible for the regular awards at Official Amaryllis Shows.

## ALPHABETICAL LIST OF ABREVIATIONS—DESCRIPTIVE TERMS AND LITERATURE CITATIONS

A—The genus **Amaryllis** L., first published in Linnaeus, "Species Plantarum", 1753; used as a prefix to registration numbers: A280, etc.

AAS.—The American Amaryllis Society; organized in 1933; affiliated with the American Plant Life Society since 1945.

APLS.—The American Plant Life Society.

autm.—autumn-flowering.

Bak. Amaryll. 1888.—Baker, J. G.; Handbook of the Amaryllideae. Geo. Bell & Sons, London, 1888.

c.—trade catalog or price list.

Chitt. 1933.—Chittenden, F. J.; Royal Horticultural Society, London. Communication dated Oct. 20, 1933.

cl.—clone; a plant reproduced by asexual (vegetative) means. For example: All plants of the clone 'Floriade' are genetically uniform with the original "mother plant", having been derived from it by vegetative division. A clone is a particular kind of **cultivar** (cultivated plant).

Cult.—plants that are maintained under cultivation.

D—Amaryllis flower division. (see Registration Procedure).

dbl.—flowers double.

DCN.—The ISCC-NBS Method of Designating Colors, and a Dictionary of Color Names. National Bureau of Standards Circular #553, 1955. Order from Supt. of Documents, U. S. Printing Office, Washington 25, D. C.

dec.—deciduous: plant loses its leaves at a certain season each year, and goes dormant.

diam.—diameter: flower size across face.

e.—early: applied to spring, summer, autumn, or winter flowering season.

err.—error: due to spelling rather than a real synonym; such names are enclosed in double quotation marks.

ev.—foliage evergreen (held for a relatively long period). Younger leaves are produced before the older ones die down; such plants do have a dormant period but the leaves are not shed.

f.—figure.

fc.—figure, illustrated in color.

fld.—flowered (as per number of florets per umbel).

fls.—florets (flowers).

fr.—mildly to moderately fragrant.

GC.—Gardeners Chronicle (London).

GW.—Gartenwelt, Berlin.

GZ.—Gartenezeitschrift, Berlin.

h.—height of scape in inches.

Hb.—Herbertia, Vols. 1-15 (1934-1948), includes Yearbook American Amaryllis Society, Vols. 1 and 2.

HCC—Wilson, Horticultural Colour Chart, publ. by Royal Horticultural Society, Vincent Square, S. W. 1, London, England.

Herb. Amaryll. 1837.—Herbert., William, Amaryllidaceae, James Ridgway & Sons, London. 1837.

Houd., Cat.—Houdyshel, Cecil; catalog, La Verne, Calif.

I.—Introducer, or introduced formally into commerce.

Ker, Cat.—Ker, Robert P. & Sons, Liverpool, England; catalog.

la.—late; applied to spring, summer, autumn, or winter flowering season.

1. hom.—later homonym; the term used when a name already in use has been applied to a different clone at a later date.

M & P.—Maerz & Paul, A Dictionary of Color; McGraw-Hill, N. Y.

NCF.—Nickerson Color Fan.—1957. Order from Arnold Arboretum, Jamaica Plain 30, Mass.

Nehr. Amaryll. 1909.—Nehrling, Henry, Die Amaryllis oder Rittersterne, Paul Parey. Berlin. 1909.

NR.—Not registered; recognized as validly published, but unregistered clone which has been published with adequate description. Such clones are not eligible for awards at the Official Amaryllis Shows unless they are registered later.

petseg., petsegs.—petepalseg, petepalsegs; refers to the inner floral segments.

PL.—Plant Life, Vols. 1 to date (1945 to date); includes also Year Book American Amaryllis Society from 1949 to date.

R.—Registered.

recu.—recurrent blooming; more than once each season.

RH.—Revue Horticole (Paris).

RHS.—Royal Horticultural Society, London, Journal.

seg., segs.—tepalseg, tepalsegs; refers to the floral segments.

semi-ev.—foliage semi-evergreen; intermediate.

setseg., setsegs.—Setepalseg, setepalsegs; refers to the outer floral segments.

spr.—spring flowering.

SPN. 1942—Standardized Plant Names, 2nd. ed., edited by Harlan P. Kelsey & William A. Dayton. J. Horace McFarland Co., Harrisburg, Pa. 1942.

su.—summer flowering.

Sweet—Sweet, British Flower Garden, 1830.

syn.—synonym; term used to apply to invalid names for the same clone.

Traub, Amaryll. 1958.—Traub, Hamilton P., The Amaryllis Manual. Macmillan Co., New York. 1958.

U—Umbel; flower cluster.

v. fr.—very fragrant.

Veit. RHS. 1890.—Veitch, Harry; The Hippeastrum (Amaryllis). Journal Royal Horticultural Society, London 12:243-255. 1890.

Veit. Cat.—Veitch, James & Sons; Chelsea, England. catalogs, 18— to date (1934).

win.—winter flowering.

x—hybrid.

# ROSTER OF AMARYLLIS HYBRIDIZERS AND/OR INTRODUCERS WITH ABBREVIATIONS

## —A—

Angell—Mr. E. A. Angell, Loma Linda Univ., Calif.
Arms.—Armstrong, England.

## —B—

Back.—Mr. James Backhouse, York, England.
Barry—Mrs. J. S. Barry, Rt. 1, Box 7, Prairieville, La.
Beck.—Mr. Ralph Becker, New Orleans, La.
Bevan—Mr. Len Bevan, Australia.
Bloss.—Mr. Harry Blossfeld, Sao Paulo, Brazil.
BM.—Mr. L. Boshoff-Mostert, South Africa.
Boel.—Boelens & Sons, Holland.
Borne.—Mr. G. Bornemann, Germany.
Bon.—Dr. E. Bonavia, England, and India.
Both—Mr. E. Both, Adelaide, Australia.
Brn.—Mr. Herman Brown, Gilroy, Calif.
Bro.—Mr. Brookes, England.
Buck.—Mr. W. Quinn Buck, Arcadia, Calif.
Budd—Mr. Bruce Budd, Australia.
Buller—Mr. Arthur C. Buller, South Africa.
Bull, W.—Mr. William Bull, England.
Bur.—Mr. Luther Burbank, Santa Rosa, Calif.
Burns—Mrs. Walter Burns, North Mimms Park, Hatfield, England.
Byrnes, E.—Mr. E. M. Byrnes, Supt., Greenhouses, U. S. White House, Washington, D. C.
Byrnes, J.—Mr. J. Wise Byrnes, Supt., Greenhouses, U. S. White House, Washington, D. C.

## —C—

Cal.—Mr. Tim Calamari, New Orleans, La.
Camm.—Messrs. William & R. Cammack, Maitland, Fla.
Car.—Mr. Jerry Carsley, Ottawa, Canada.
Chal.—Mr. A. E. Challis, Ottawa, Canada.
Chan.—Chandra Nursery, Rhenock, West Bengal, India.
Chand.—Mr. Chandler, Australia.
Clem.—Mrs. Margie Clements, Metairie, La.
Clint—Mr. & Mrs. Morris Clint, Rio Grande Valley, Texas.
Col.—Mr. Colville, England.
Comp.—Mr. George Compere, Calif.
Cook.—Mr. Clive Cookson, Hexham, England.
Cowl.—Mr. G. K. Cowlishaw, New South Wales, Australia.
Cron.—Mrs. John F. Cronin, Lutz, Fla.

## —D—

De Cand.—De Candolle, France.
Dien.—Mr. Richard Diener, Oxnard, Calif.
Dier.—Mr. Joao Dierberger, Sao Paulo, Brazil.
Dom.—Mrs. B. A. Dominick, Orlando, Fla.
Dorr—Mrs. H. E. Dorr, Metairie, La.
Doug.—Mr. James Douglas, England.
Duff—Lady Duff, England.
Dug.—Mr. R. E. Duggan, New Orleans, La.
Dup., H.—Mr. H. F. Du Pont, Delaware.
Dup., P.—Mr. Pierre S. Du Pont, Delaware.
Dupuis—Dupuis Bulb Garden, Miami, Fla.
Dyer—Dr. R. A. Dyer, South Africa.

—E—

Eub.—Mr. R. W. Eubank, Corpus Christi, Texas.

—F—

Fiel.—Mr. C. R. Fielder, North Mimms Park, England.
Finl.—Mr. Kenneth Finlayson, England.
Fitch—Mr. Charles Marden Fitch, Mamaroneck, N. Y.
Font.—Mr. Henry Fontcuberta, New Orleans, La.
Fost.—Mr. Mulford B. Foster, Orlando, Fla.

—G—

Garr.—Garroway & Co., Bristol, England.
Gasp.—Mr. S. P. Gasperecz, New Orleans, La.
Gil.—Mr. Charlie Gilbert, Australia.
Goed.—Mr. Robert D. Goedert, Jacksonville, Fla.
GPC.—Garfield Park Conservatory, Chicago, Ill.
Graaff, J. de,—Mr. Jan de Graaff, Leyden, England.
Grif.—Mr. Griffin, England.
Groen.—Mr. A. C. Groenewegen, Netherlands.
Gron.—Mr. Otto Gronen, Rock Island, Ill.

—H—

H&S—Messrs. Herren Haage & Schmidt, Germany.
Hamb.—Mr. Hambledon, England.
Har.—Mrs. H. L. Harris, Corpus Christi, Texas.
Harr., R.—Mr. R. Harrison, England.
Harr., W. F.—Mr. W. Frank Harrison, Rancho del Cielo, Mexico.
Hawes—Mr. W. Hawes, Australia.
Hay.—Mr. Wyndham Hayward, Winter Park, Fla.
HDL.—Harry de Leeuw Co., Ltd., South Africa.
Heat.—Mr. I. W. Heaton, Orlando, Fla.
Hend., E. G.—Mr. E. G. Henderson, England.
Hend., Wm. H.—Mr. Wm. H. Henderson, Fresno, Calif.
Henry—Mrs. Mary G. Henry, Gladwyne, Pa.
Herb.—Mr. William Herbert, England.
Holf., G.—Sir George Holford, England.
Holf., R. S.—Mr. R. S. Holford, Westonbirt, England.
Honf.—Mr. B. W. Honfeld, Wasco, Calif.
HS.—Messrs. Howard & Smith, Montebello, Calif.
Houd.—Mr. Cecil Houdyshel, La Verne, Calif.

—I—

Ikeda—Mr. Basil N. Ikeda, Japan.

—J—

Jay—Frau Anna Jay, Germany.
John.—Mr. Johnson, England, first **Amaryllis** breeder.
Jolly—Mr. Tom Jolly, Australia.
Jones—Mr. Fred B. Jones, Corpus Christi, Texas.

—K—

Kel.—Mr. James Kelway, England.
Ker—Messrs. Robert Ker & Sons, Liverpool, England.
Kl.—Mrs. John Klein, Jr., New Orleans, La.
Kre.—Mr. E. H. Krelage, Holland.

—L—

Laine—Mr. L. L. Laine, Chalmette, La.
Lanc.—Mr. Sydney Percy Lancaster, Lucknow, India.
Lat.—Mr. Walter R. Latapie, New Orleans, La.
Law.—Mr. Lawrence, England.
Lea.—Mr. Reginald Leahy, Australia.
Lind.—Mr. Albert Lindsey, Australia.
Lud.—Ludwig & Co., Hillegom, Holland.

—M—

McCann—Messrs. J. J. McCann & Sons, Punta Gorda, Fla.
McCul., E.—Mr. E. McCullock, Mosman, Australia.
McCul., P.—Mr. P. V. McCullock, Warrawee, Australia.
McLen.—Mr. W. F. McLendon, Ponchatoula, La.
Mead—Mr. Theodore L. Mead, Oviedo, Fla.
Mel.—Mr. Melazzo, Italy.
Metz—Mr. J. Gurrad Metz, California.
Mitch.—Mrs. Donald Mitchel, New Orleans, La.
Mohr—Mr. O. Mohr, Gostrop, Denmark.
Mon.—Mr. G. L. Monier, Metairie, La.
Morris—Mr. Wm. Morris, 89 Mills St., Warners Bay, NSW, Australia.
Mull.—Mr. Tobby Mullen, New Orleans, La.
Muns.—Mrs. Sara & Billie Munsterman, Buras, La.

—N—

Nehr.—Mr. Henry Nehrling, Gotha, Fla.
Nel.—Mr. Olaf Nelson, Temple City, Calif.
Nels.—Mr. Ira S. Nelson, Lafayette, La.
Nort.—Mr. J. B. S. Norton, Hyattsville, Maryland.

—O—

Ober.—Mr. P. H. Oberwetter, Texas.
O'Bri.—Mr. James O'Brien, England.

—P—

Park.—Mrs. Isabelle Parker, Biloxi, Miss.
Pat.—Mr. Bib Paterson, Australia.
Perr.—Mr. W. J. Perrin, New Orleans, La.
Pfis.—Mr. H. Pfister, Washington, D. C.
Pick.—Mrs. A. C. Pickard, Houston, Texas.
Price—Mr. Hugh Price, Australia.

—R—

Raa.—Mr. R. E. Raasch, Corpus Christi, Texas.
RBG, Kew—Royal Botanical Gardens, London, England.
Ram.—Mr. Charles Ramelli, Biloxi, Miss.
Rice—Mr. W. E. Rice, Downey, Calif.
Roths.—Mr. Lionel de Rothschild, England.

—S—

S. Afr. NH.—South African National Herbarium, Pretoria, South Africa.
Sam.—Mr. Perce Sampson, Australia.
Sang.—Mr. B. M. Sangster, Orlando, Fla.
Say.—Mr. W. S. Sayler, Sr., Fernandina Beach, Fla.
Scavia—Mr. Jack Scavia, California.
Schee.—Mr. John Scheepers, New York, N. Y.
Scher.—Messrs. Valentine Schertzer & Sons, Holland.

Schm.—Mr. Frederick B. Schmitz, Port Sulphur, La.
Schr.—Baron Schroeder, England.
Seale—Mrs. B. E. Seale, Dallas, Texas.
Searles—Mr. Harry Searles, Orlando, Fla.
Smith, B. D.—Mr. Beckwith D. Smith, Jacksonville, Fla.
Smith, J. C.—Dr. Joseph C. Smith, La Mesa, Calif.
Sol.—Mr. Robert L. Solomon, Tampa, Fla.
Sou.—Mr. Eugene Souchet, France.
Speed—Mr. Thomas Speed, Chatsworth, England.
Spring.—Mr. John A. Springer, Florida.
Stan.—Reverend Thomas Staniforth, England.
Ste.—Mr. Victor Stephens, Australia.
Stew.—Mr. J. F. Stewart, Downey, Calif.
St. J.—Mrs. Harry St. John, New Orleans, La.
Str.—Sir Charles Strikland, England.
Strout—Mrs. Edith Strout, California.
Sweet—Mr. Sweet, England.

**—T—**

Terry—Mr. J. W. Terry, Hattiesburg, Miss.
Tilg.—Mrs. W. G. Tilghman, Palatka, Fla.
Traub—Dr. Hamilton P. Traub, La Jolla, Calif.
T & H—Dr. Hamilton P. Traub & Mr. Ausher E. Hughes, Orlando. Fla.
Tress—Mr. Robert Van Tress, Chicago, Ill.
Turner—Mrs. Marie Turner, Temple City, Calif.

**—U—**

Ulrick—Mr. L. W. Ulrick, Brisbane, Australia.
U. S. D. A.—U. S. Dept. of Agri., Bureau of Plant Industry, Washington, D. C.

**—V—**

Vas.—Mr. Frank Vasku, Winter Park, Fla.
VE.—Mr. A. C. Van Eeden, Holland.
Veit. J.—Messrs. James Veitch & Sons, Chelsea, England.
V. Hou.—Mr. Louis Van Houtte, Belgium.
VM.—Messrs. G. C. Van Meeuwen & Sons, Heemstede, Holland.
VT.—C. G. Van Turbergen, Haarlem, Holland.
VW.—M. Van Waveren & Sons, Hillegom, Holland.
VZ.—Van Zyverden Bros., Inc. U. S. A.

**—W—**

W-C.—C. Warmenhoven, Hillegom, Holland.
W-WS.—W. S. Warmenhoven, "Zonnewende", Hillegom, Holland.
W-WZ.—W. Warmenhoven & Zonen, Hillegom, Holland.
Whe.—Mr. R. W. Wheeler, Winter Park, Fla.
Will.—Mr. B. S. Williams, England.
Wolfe—Mr. Russell S. Wolfe, Orangeburg, South Carolina.
Wors.—Mr. A. Worsley, Middlesex, England.

**—Z—**

Zand.—Zandbergen Bros., Inc., Valkenburg, Holland.
Zeiner—Mr. G. D. Zeiner, Florida.

# CATALOG OF HYBRID AMARYLLIS CULTIVARS, 1799 TO DEC. 31, 1963

The names of hybrid **Amaryllis** clones, both valid and invalid, and also a few of the cultivated wild species, are listed alphabetically. For descriptions of the wild **Amaryllis** species see Traub—The Amaryllis Manual. Macmillan Co., New York. 1958; and Plant Life for species published since 1958.

The reader should consult the list of abbreviations for the meaning of any that appear in this Catalog.

All completed registrations up through December 31, 1963 are included in the Catalog.

## —A—

'Acadia', R; A-2; sulphur-colored, high-lighted and veined light red. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Achilles', NR; Hb. 1:63. 1934.

'Acquisition' (Veit. 1889), R; A-3; Chitt. 1933. Hb. 1:46. 1934.

'Acramanii' (Garr. 1835), R; A-4; err: "acramanni", "ackermannii"; **A. aulica** var. **Platypetala** x **A. psittacina.** Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Adonis', NR; Hb. 1:63. 1934.

'Africana' (HDL. 1963), R; A-760, D-5A; U-4fld; 15″ h; fls. 6½″ diam; scarlet (HCC-19), darker throat; spr.; I.—VZ. 1963.

'African Glow' (Buller), NR; brilliantly flame colored. PL. 19:22. 1963.

'Agamemnon' (Holf. 1906), R; A-5; Chitt. 1933. Hb. 1:46. 1934.

'Agatha' R; A-773. I.—Goed. 1962 for a Dutch Breeder.

'Agneta', R; A-6; orange-red, bordered white. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Aileen Ingle' (BM. 1962), NR; claret rose on white.

'Albaron' (VM. 1962), R; A-741, D-5A; U-4fld; 16″ h; fls. 6½″-7½″ diam; currant red (HCC-821), cardinal red throat. PL. 19:67. 1963.

'Alabaster' (Traub, 1960), R; A-553, D-5A; U-4fld; 22″ h; large pure white; spr.; dec.; PL. 16:76. 1960.

'Alba Rosea Marginata' (Ker), R; A-6, D-5; white, segs veined rose red. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Alcyone' (VM. 1952), R; A-518, D-4A; 22″ h; fls. 7″ diam; dark red. PL. 15:46. 1959.

'Albino' (VM. 1948), R; A-517, D-4; U-4fld; 22″ h; fls. 7″ diam; pure white. PL. 15:46. 1959.

'Alec' (BM. 1954), R; A-562, D-5B; U-2fld; 16″ h; fls. 7½″ diam; capsicum red (HCC-715), currant red flush, white towards throat. PL. 17:51. 1961.

'Alexandria' (VM.), NR; blood red.

'Alfred' (Arms. 1949), R; A-7, D-5A; fls. 8½″ diam; pure white. PL. 5:88. 1949.

'Alipur Beauty' (Lanc. 1940), R; A-8, D-8; U-4fld; 15″ h; fls. 4″ diam; carmine pink, tube pale green, white bands on petals; **A. stylosa** x **A. reticulata striatifolia,** 'Mrs. Garfield'. Hb. 6:238. 1939.

'Allmanni' (Col.), R; A-9; **A. calyptrata** x **A. vittata.** Herb. Amaryll. 1837. Hb. 1:46. 1934.

'Alpha' (BM. 1954), R; A-563, D-5B; U-2-3fld; 20″ h; fls. 7½″ diam; vermilion red (HCC-18). PL. 17:51. 1961.

'Alta Clarae' (Herb.), R; A-10; **A. psittacina** x 'Griffini'. Hb. 1:46. 1934.

'Amazon' (BM. 1954), R; A-564, D-5B; U-4fld; 20″ h; fls. 7½″ diam; currant red (HCC-821), flushed white. PL. 17:51. 1961.

'Ambiguum' R; A-11. **A. elegans** x **A. vittata.** Bak. Amaryll. 1888. Hb. 1:46. 1934.

'America' (Heat. 1938), R; A-15, D-5; golden pink, cream base, whitish keel shaded pink, speckled. Hb. 5:146. 1938.

'American Beauty' (Zeiner), NR; Hb. 11:256. 1944.

'American Express' (Lud. 1951), R; A-421, D-5A; U-4fld; 26″ h; fls. 8″ diam; oriental red (HCC-819), violet red reflection. PL. 14:55. 1958.

'American Fashion' (Lud. 1954), NR; U-4fld; 26″ h; fls. 8″ diam; rose madder (HCC-23). c. Lud. 1954.

'American Idol' (Lud. 1956), NR; U-4fld; 30″ h; fls. 11″ diam; salmon (HCC-412), salmon-red throat, upper petals bearded. c. Lud. 1956.

'American Pride' (Gasp. 1964), R; A-748, D-5A; U-4fld; 16″ h; fls. 7″ diam; currant red (HCC-821), darker throat.

'Amor' (VM. 1963), R; A-742, D-5A; U-4fld; 15″ h; fls. 7″ diam; geranium lake (HCC-20/1), greenish-white midribs, stripes, PL. 19:67. 1963.

'Anagram' (BM. 1954), R; A-555, D-5B; U-2-3fld; 16″ h; fls. 7½″ diam; geranium lake (HCC-20), flushed white. PL. 17:51. 1961.

'Andersoni' (Herb.), R; A-12; **A. striata** x **A. vittata.** Hb. 1:46. 1934.

'Andromache' (Ker), R; A-13, D-5; violet red. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Andromeda' (Ker), R; A-14, D-5; light ground with red veins. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Anita' (Gasp. 1958), R; A-399, D-5B; U-4fld; 30″ h; fls. 7½″ diam; rose bengal (HCC-25), mid-stripe on segs; fr.; spr. PL. 14:54. 1958.

'Anna Paulowna' (W-WS. 1951), R; A-492; U-4fld; 26″ h; fls. 8″ diam; salmon-red, red throat. PL. 15:44. 1959.

'Anne Lindberg' (Dom. 1934), NR. Hb. 2:92. 1935.

'Aphrodite' (Ker), R; A-16, D-5A; white, striped and feathered red. Hb. 1:46. 1934.

'Aphrodite' (VM. 1962), R; A-743, D-5A; U-4-6fld; 16″ h; fls. 6″ diam; signal red (HCC-719), green throat, white midribs. PL. 19:67: 1963.

'Apollo' (Ker), R; A-18, D-5; carmine red, edged white. Hb. 1:46. 1934.

'Apollo' (W-C. 1962), R; A-725, D-5A; U-3-4fld; 21″ h; fls. 8″ diam; vermilion red (HCC-18); spr.; I.—Goed, 1962. PL. 19:67. 1963.

'Apple Blossom' (Holf. 1899), R; A-17; Chitt. 1933. Hb. 1:46. 1934.

'Apple Blossom' (Lud. 1954), R; A-422, D-5B; U-4-5fld; 22″ h; fls. 8″ diam; white, with dawn pink (HCC-523), lower segs lighter shade, red ring in throat; spr; dec. PL. 14:55. 1958.

'Arona', R; A-19; yellow (like Clivia yellow). Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Artemise' (Sou.), R; A-20; **A. vittata** hybrid. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'At Dawning' (BM 1954), R; A-566, D-5A; U-2fld; 14″ h; fls. 7″ diam; scarlet (HCC-19), white star in throat. PL. 17:51. 1961.

'Attraction' (Lud. 1958), R; A-457, D-5B; U-4fld; 30″ h; fls. 7½″ diam; syn: "Red Radiance", capsicum red (HCC-715), darker throat; spr; dec; PL. 15:42. 1959.

'Audrey' (Font. 1958), R; A-405, D-5B; U-4fld; 24″ h; fls. 6″ diam; rose opal (HCC-o22) greenish throat, segs reflexed; spr; ev. Mead hybrid crimson x cl. Pink Perfection. PL. 14:55. 1958.

'August Koch' (GPC 1937), R; A-21; U-4fld; orange red, pale yellowish star; syn: "Hippecoris garfieldii, no. 13". I.—AAS. 1937. Hb. 4:142. 1937.

'Aurora' (Ker), R; A-22, D5; light red, strongly veined red. Nehr. Amaryll. 1909. Hb. 1:46. 1936.

'Autumn Beauty' (Veit.), R; A-23; **A. reticulata striatifolia** x **A. leopoldii**; autm. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Autumn Charm' (Veit.), R; A-24; **A. reticulata striatifolia** x **A. leopoldii**; autm. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Averunicus' (Veit. 1901), R; A-25; orange red, bordered white. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Azalea' (BM. 1954), R; A-567, D-5B; U-2fld; 24″ h; fls. 7″ diam; azalea pink (HCC-618), flushed white. PL. 17:51. 1961.

## —B—

'Baby Pink' (Gasp. 1958), R; A-400, D-5B; U-4fld; 26″ h; fls. 6½″ diam; solferino purple (HCC-26/3), greenish throat; spr; fr. PL. 14.54. 1958.

'Bacchus' NR; Hb. 1:63. 1934.

'Baffin' (Sou.), R; A-26; **A. vittata** hybrid Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Baroness Schroder' (Schr. 1928), R; A-27; Hb. 1:46. 1934.

'Baron Palles' (Will.), R; A-28; cl. 'Defiance' x **A. reticulata**; autm. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Batemanni' (Col.), R; A-29; **A. reginae** x **A. striata.** Herb. Amaryll. 1837. Hb. 1:46. 1934.

'Baton Rouge' (Lud. 1954), NR; U-4fld; 30″ h; fls. 8½″ diam; signal red (HCC-719); la. spr; c. Ludwig & Co. 1954.

'Beacon' (Whe. 1940), R; A-30, D-5A; fls. 8″ diam; red with violet tones, darker center, lighter towards edges. Hb. 7:130. 1940.

'Beacon' (W-WS. 1954), R; A-493; U-4fld; 26″ h; fls. 10″ diam; salmon. white midrib. PL. 15:44. 1959.

'Beau Joliat' (W-WS), R; A-494; 22″ h; fls. 3½″ diam; rosy red. PL. 15:44. 1959.

'Beautiful Lady' (Lud. 1963), R; A-756, D-5A; U-4fld; 26″ h; fls. 10″ diam; mandarin red (HCC-17/1/2), azalea pink influence, darker throat; spr.

'Belinda' (VM. 1963), NR; dark velvety red, darker throat. R; A-750.

'Bella Vista' (Lud. 1960), R; A-555, D-5A; U-4fld; 22″ h; fls. 8″ diam; cherry red (HCC-722/1), dark red throat. PL. 17:53. 1961.

'Bellini' (VM. 1963), R; A-783, D-5A; U-3-4fld; 16″ h; fls. 6½″ diam.; tyrian rose (HCC-24/2). Registered and I.—Goed. 1963.

'Ben Hur' (Nehr.), R; A-31; orange red; **A. belladonna** x cl. 'Empress of India'. Hb. 1:46. 1934.

'Benthamii' (Herb.), R; A-32; gloomy but variable red. Hb. 1:46. 1934.

'Berengaria' (Heat. 1938), R; A-33, D-5; soft dark pink with white star. Hb. 5:146. 1938.

'Bertha Vasku' (Vas. 1936), R; A-34, D-4B; deep red. Hb. 3:92. 1936.

'Bert Merrill' (Traub 1934), NR; Hb. 2:92. 1935.

'Besson', R; A-35; Chitt. 1933. I.—Holf. 1898. Hb. 1:46. 1934.

'Bethlehem Gem' (BM. 1954), R; A-568, D-5B; U-3fld; 20″ h; fls. 9″ diam; brick red (HCC-o16), white fusion on center of segs. PL. 17:51. 1961.

'Betty Jean' (Arms. 1945), R; A-36, D-5B; fls. 10″ diam; white, pink penciling in throat. Hb. 12:104. 1945.

'Big Chief' (Zeiner 1944), R; A-37; fls. 7″ diam; solid red. Hb. 11:266. 1944.

'Black Beauty', R; A-38; Chitt. 1933. I—Holf. 1925. Hb. 1:46. 1934.

'Black Prince', R; A-39; Chitt. 1933. I.—Holf. 1903. Hb. 1:47. 1934.

'Blazing Star' (Lud. 1958), R; A-463, D-5A; U-4fld; 22″ h; fls. 9½″ diam; dark vermilion (HCC-717), darker throat. PL. 15:42. 1959.

'Bleeding Heart' (Lud. 1954), NR; U-3-4fld; fls. 8″ diam; blood red (HCC-820). c. Ludwig & Co. 1954.

'Blushing Beauty' (W-WS. 1962), R; A-683, D-5A; U-3-4fld; 20″ h; fls. 7″ diam; rose pink (HCC-427), white on 3 upper segs, lower segs white with orient pink (HCC-416/3). PL. 19:65. 1963.

'Bondi Beach' (BM 1958), R; A-633, D-5B; U-2fld; 19″ h; fls. 7½″ diam; shrimp red (HCC-616). PL. 17:52. 1961.

'Bon Ton' (VW 1959), R; A-653; U-4fld; 20″ h; fls. 8″ diam; carmine pink (HCC-21). PL. 17:53. 1961.

'Bordeaux' (W-WS. 1951), R; A-495; U-4fld; 28″ h; fls. 10″ diam; orange-scarlet (HCC-19), deep scarlet in throat. PL. 15:45. 1959.

'Bouquet' (Lud. 1953), R; A-424, D-5A; U-4fld; 28″ h; fls. 9″ diam; begonia rose (HCC-619-619/2), throat and stamens empire rose (o621); spr; dec. PL. 15:42. 1959.

'Boy Rolf' (Bur. 1905), NR. Hb. 9:152. 1942.

'Brenda', R; A-40. Chitt. 1933. I.—Veit. 1897. Hb. 1:47. 1934.

'Brian Boru', R; A-41. Chitt. 1933. I.—Holf. 1906. Hb. 1:47. 1934.

'Bridal Bouquet' (BM 1958), R; A-634, D-5A; U-1-3fld; 18″ h; fls. 9″ diam; light cream, pin-pointed delft rose, picotee edges. PL. 17:52. 1961.

'Bridesmaid' (Lud. 1953), R; A-423, D-5B; U-3-4fld; 24″ h; fls. 7½″ diam; pure white, greenish tinge in throat; spr; dec. PL. 15:43. 1959.

'Brilliant' (VE), NR; **A. pardina** hybrid. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Brilliant' (Lud. 1953), R; A-425, D-5A; U-4fld; 24″ h; fls. 8½″ diam; signal red (HCC-719), dark red throat; spr; dec. c. Ludwig & Co. 1954. PL. 15:43. 1959.

'Brilliant Star' (W-WS. 1962), R; A-708, D-5A; U-4fld; 20″ h; fls. 6″ diam; currant red (HCC-821) with cardinal red (822) in throat. PL. 19:65. 1963.

'Britannia' (Heat. 1938), R; A-43; light salmon, upper petals veined along keel, lower petals shaded white to pink at tips. Hb. 5:146. 1938.

'Brocade' (BM 1957), R; A-569, D-5B; U-2-3fld; 18″ h; fls. 8½″ diam; porcelain rose (HCC-620), flushed white, tips azalea pink. PL. 17:51. 1961.

'Broginart' (Sou.), R; A-1; **A. vittata** hybrid. Nehr. Amaryll. 1909. Hb. 1:46. 1934.

'Brookesi' (Bro.), R; A-44; **A. elegans** x **A. johnsonii.** Hb. 1:47. 1934.

## —C—

'Calliope' (Ker), R; A-45, D-5; scarlet red, rose red sheen. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Calphurnia', R; A-46; rose, white star. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Calypso' R; A-47. Chitt. 1933. I.—Holf. 1910. Hb. 1:47. 1934.

'Camellia' (VM 1935), R; A-519, D-7; 24″ h; fls. 8″ diam; salmon rose, partially double. PL. 15:46. 1959.

'Cammack's Star' (Camm.), NR; PL. 10:79. 1954.

'Candy Cane' (Lud. 1954), R; A-426, D-5A; 28″ h; fls. 9″ diam; segs white-edged, white band in center and bright capsicum red (HCC-715/3) bands between white; spr; dec. c. Ludwig & Co. 1954. PL. 15:42. 1959.

'Cannae Butterfly' (McCul. E), NR; D-6; U-4fld; red on white ground, greenish white midribs, thickly striped and dotted red. PL. 10:27, f. 1. 1954.

'Capsicum' (BM. 1956), R; A-570, D-5B; U-2fld; 20″ h; fls. 7½″ diam; capsicum red (HCC-715), flushed white. PL. 17:51. 1961.

'Captain McCann' (McCann), NR; D-7; dark red. PL. 6:108. 1950.

'Cardinal' (Chandler), NR; SPN. 13. 1942.

'Cardinal' (Lud. 1958), R; A-464, D-5A; U-4fld; 24″ h; fls. 8″ diam; oxblood red (HCC-820), currant red throat; spr; dec. PL. 15:42. 1959.

'Cardinal's Choice' (BM. 1954), R; A-572, D-5B; U-2-3fld; 17″ h; fls. 7½″ diam; cardinal red (HCC-822). PL. 17:51. 1961.

'Cardinal Wolsey', R; A-48. Chitt. 1933. I.—Holf. 1910. Hb. 1:47. 1934.

‘Cardinal Wolsey’ (BM. 1954), R; A-571, D-5B; U-2fld; 14″ h; fls. 7″ diam; cardinal red (HCC-822). PL. 17:51. 1961.

‘Carmen’ (Whe. 1941), R; A-49, D-5A; fls. 8½″ diam; crimson, violet tones. Hb. 8:92. 1941.

‘Carminata’ (Ker), R; A-50, D-5; light rose red. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

‘Carnarvoni’ (Herb.), R; A-51; **A. elegans** x **a. johnsonii.** Hb. 1:47. 1934.

‘Carnavonia’ (de Cand.), NR; **A. reginae** x **A. vittata.** Herb. Amaryll. 1837. Hb. 1:47. 1934.

‘Carolina’ (BM 1957), R; A-573, D-5B; U-4fld; 18″ h; fls. 7″ diam; creamy white, flushed and nettled scarlet. PL. 17:51. 1961.

‘Carolyn’ (Burns 1936), R; A-52; large blood-red. Hb. 3:92. 1936.

‘Carousel’ (Lud. 1963), R; A-754, D-5A; U-4fld; 30″ h; fls. 9″ diam; capsicum red (HCC-715), and white.

‘Cartoni’ (Herb.), R; A-53; **A. aulica** x cl. ‘Sweetii’. Hb. 1:47. 1934.

‘Caruso’ (Lud. 1950), NR; U-4fld; 24″ h; fls. 8″ diam; orange-scarlet, darker in throat. PL. 7:72. 1951.

‘Casper Ludwig’ (Lud. 1948), R; A-196; 24″ h; fls. 7½″ diam; pure white with slight greenish throat. Hb. 15:69. 1948.

‘Cassandra’ (Ker), R; A-54, D-5; red, white veins. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

‘Cathedral Peak’ (BM. 1958), R; A-574, D-5B; U-2-3fld; 20″ h; fls. 8½″ diam; blood red (HCC-820). PL. 17:51. 1961.

‘Cathedral Windows’ (Ram. 1959), R; A-543, D-5A; 23″ h; fls. 6½″ diam; brick red (HCC-o16) with white, light orange effect; spr; dec. PL. 16:76. 1960.

‘Catherine Valente’ (W-WS. 1962), R; A-688, D-5B; U-3-4fld; 23″ h; fls. 7″ diam; delft rose (HCC-o20/1), geranium lake (20) in upper segs towards throat. PL. 19:65. 1963.

‘Cavalier’, R; A-774. I.—Goed. 1962 for a Dutch breeder.

‘Cecelia’, R; A-55 white over a rose scarlet ground. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

‘Celestine’ (Hay. 1938), R; A-56, D-5; U-4fld; fls. 8″ diam; salmon coppery-pink, white keels to 1″ of tip of segs. Hb. 5:146. 1938.

‘Cerise Magnificum’, R; A-57. Chitt. 1933. I.—Schr. 1928. Hb. 1:47. 1934.

‘Champion’s Reward’ (Lud. 1954), R; A-427, D-5A; U-4fld; 26″ h; fls. 9″ diam; oriental red (HCC-819), glossy throat; spr; dec. PL. 14:55. 1958.

‘Charlemagne’ (VM), NR; large purple red.

‘Charles Penny’, R; A-58. Chitt. 1933. I.—Hamb. 1892. Hb. 1:47. 1934.

‘Charmaine’ (Vas. 1940), R; A-59; brilliant red, creamy throat. Hb. 6:155. 1940.

‘Chartreuse’ (BM. 1957), R; A-575, D-5B; U-2fld; 18″ h; fls. 7½″ diam; chartreuse green, flushed cream and porcelain rose, scarlet lines. PL. 17:51. 1961.

‘Chelsoni’ (VE), R; A-60; **A. pardina** hybrid. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

‘Cherokee’ (W-WS. 1954), R; A-496; U-4fld; 26″ h; fls. 8″ diam; metalic red with orange cast. PL. 15:45. 1959.

‘Cherry’ (BM. 1955), R; A-576, D-5B; U-3fld; 24″ h; fls. 8″ diam; cherry red (HCC-722). PL. 17:51. 1961.

‘Cherry Bing’ (BM. 1958), R; A-577, D-5B; U-2fld; 14″ h; fls. 8″ diam; cherry red (HCC-722), tips lighter shade. PL. 17:51. 1961.

‘Cherry Flip’ (BM. 1958), R; A-578, D-5B; U-3fld; 15″ h; fls. 7″ diam; cherry red (HCC-722), currant red overlay. PL. 17:51. 1961.

‘Cherry Liquor’ (BM. 1959), R; A-635, D-5B; U-3fld; 18″ h; fls. 8″ diam; cherry red (HCC-722), lighter shade towards throat. PL. 17:52.

1961.

'Cherry Queen' (Lud.), NR; U-4fld; 30″ h; fls. 7″ diam; cherry red (HCC-722). c. Ludwig & Co. 1954.

'Cherry Red' (Lud. 1948), R; A-61; cherry red (HCC-722). Hb. 15:69. 1948.

'Chimboraso', R; A-62. Chitt. 1933. I.—Holf. 1897. Hb. 1:47. 1934.

'Chimere', R; A-63. Chitt. 1933. I.—Veit. 1895. Hb. 1:47. 1934.

'Christmas Dream' (VW. 1960), R; A-654, D5A; U-3-4fld; 22″ h; fls. 8″ diam; orange-scarlet, satin finish in throat. PL. 17:53. 1961.

'Christmas Gift' (Lud. 1959), R; A-539, D-5A; U-4fld; 23″ h; fls. 8″ diam; white with soft green throat; la.-spr. PL. 16:75. 1960.

'Christmas Joy' (W-WS), R; A-497; 24″ h; fls. 3½″ diam; red. PL. 15.45. 1959.

'Circus' (Lud. 1959), R; A-538, D-5A; U-4fld; 28″ h; fls. 9″ diam; signal red (HCC-719-719/2), white stripe and outer edge; spr. PL. 16:75. 1960.

'Clemence' (Sou.), R; A-64; **A. vittata** hybrid. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Cleopatra' (V. Hou.), R; A-65. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Cleopatra' (VM. 1953), R; A-520; 20″ h; fls. 7″ diam; pure salmon. PL. 15:46. 1959.

'Climax', R; A-66. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Clive Cookson' (Cook. 1936), R; A-67; fls. 7″ diam; vermilion, blood-red in throat; reflexed. Hb. 3:92. 1936.

'Clonia', R; A-68; white, veined red. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Clovelly', R; A-69; Chitt. 1933. I.—Holf. 1901. Hb. 1:47. 1934.

'Clown' (VW. 1958, R; A-406, D-5; U-3-4fld; 24″ h; fls. 9″ diam; white with vivid red veins. PL. 14:55. 1958.

'Colvilli' (Col.), R; A-70; **A. reticulata** x **A. reginae.** Herb. Amaryll. 1837. Hb. 1:47. 1934.

'Comte de Germiny' (Will.), R; A-71; **A. reticulata** x cl. 'Defiance'; autm. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Concerto', R; A-775, D-5A; U-4fld; 15″ h; fls. 7″ diam.; scarlet red (HCC-19); spr.; dec. I.—Goed. 1962 for Dutch grower.

'Connie Fay' (Sol. 1961), R; A-677, D-7; U-2fld; 15″ h; fls. 7½″ diam; rosy red, white in center of segs. PL. 18:42. 1962.

'Conquerant' (Sou.), R; A-72; **A. vittata** hybrid. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Coral Island' (BM. 1957), R; A-636, D-5B; U-2fld; 14″ h; fls. 7″ diam; azalea pink (HCC-619) on uranium green (63) base, rhodonite red (0022) veining, cream border. PL. 17:52. 1961.

'Corinna', R; A-73. Chitt. 1933. I.—Veit. 1893. Hb. 1:47. 1934.

'Cornut' (Ker), R; A-74, D-5; rose red. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Cornado' (Bur. 1913), R; A-75; U-3-4fld; fls. 8″ diam; scarlet with oriental crimson; e.-spr. Hb. 9:154. 1942.

'Corpus Christi' (BM. 1954), R; A-579, D-5B; U-4fld; 20″ h; fls. 7½″ diam; white, speckled scarlet and edge around all petals. PL. 17:51. 1961.

'Count Cavour' (VE.), R; A-76. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Cream Parfait' (BM. 1958), R; A-637, D-5B; U-2fld; 15″ h; fls. 8″ diam; white with jasper red markings. PL. 17:52. 1961.

'Creon', R; A-77; lower segs lilac red, upper segs veined red. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Crimson Beauty' (Lud. 1954), NR; U-3-4fld; 28″ h; fls. 8″ diam; crimson (HCC-22), tips shade darker. c. Ludwig & Co. 1954.

'Crimson Comet' (Zeiner, 1946), R; A-78, D-4A; U-4fld; fls: 6½″ diam; crimson, yellow midrib. Hb. 13:110. 1946.

'Crimson King', R; A-79; Chitt. 1933. I.—Veit. 1892. Hb. 1:47. 1934.

'Croesus' (Chandler), NR; SPN. 13. 1942.

'Croomii', R; A-80; A. elegans hybrid. Bak. Amaryll. 1888. Hb. 1:47. 1934.

'Crown Jewels' (BM), R; A-666; dark red PL. 17:52. 1961.

'Crown Prince of Germany', R; A-81. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Cupid' (Ker), R; A-82, D-5; pure white, slightly penciled red. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Cupido' (VM. 1962), NR; salmon pink. I.—Goed. 1962.

'Cupid's Rival' (Lud. 1955), NR; 28″ h; fls. 8″ diam; red, darker throat. c. Ludwig & Co. 1955.

'Currant Wine' (BM. 1960), R; A-638, D-5B; U-3fld; 18″ h; fls. 8″ diam; currant red (HCC-821). PL. 17:52. 1961.

## —D—

'Dagbreek' (BM. 1956), R; A-639, D-5A; U-3-4fld; 18″ h; fls. 7½″ diam; blood red (HCC-820). PL. 17:52. 1961.

'Daintiness' (Lud. 1954), R; A-428, D-5B; U-4fld; 24″ h; fls. 8″ diam; porcelain rose (HCC-620), crimson rose towards center of segs. c. Ludwig & Co. 1954. PL. 14:55. 1958.

'Dallas Bride' (BM. 1954), R; A-640, D-5B; U-4fld; 18″ h; fls. 7½″ diam; pure white. PL. 17:52. 1961.

'Danny Kaye' (VW. 1962), R; A-733, D-5A; U-4fld; fls. 8″ diam; scarlet (HCC-19), creamy midrib deep in throat; spr. PL. 19:67. 1963.

'Daones', R; A-83. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Dark Red Bonnet' (Vas. 1940), R; A-86; fls. 7″ diam; dark red. Hb. 6.155. 1940.

'Dark Red Bonnet' (Camm.), NR. PL. 10:79. 1954.

'Daudenii' (Herb.), R; A-84; cl. 'Griffini' x **a. johnsonii.** Hb. 1:47. 1934.

'David Hollestelle' (VW. 1962), R; A-734, D-5A; U-4fld; 18″ h; fls. 8″ diam; scarlet (HCC-19); spr. PL. 19:67. 1963.

'Dawn' (Heat. 1934), R; A-87, D-5; U-3fld; fls. 10″ diam; white, pink veins lower petals; spr; dec. Hb. 1:105. 1934.

'Dawn' (BM. 1955), R; A-580, D-5B; U-3fld; 18″ h; fls. 7″ diam; creamy white, flushed empire rose. PL. 17:51. 1961.

'Dawn Rose' (BM. 1954), R; A-581, D-5B; U-2fld; 16″ h; fls. 7″ diam; porcelain rose (HCC-620) and white, scarlet stitching; spr. PL. 17:51. 1961.

'Day Dream, R; A-776, D-5A; U-4fld; 19″ h; fls. 7″ diam; dawn pink (HCC-523), lower petsegs lighter shade; spr., dec. I.—Goed. for a Dutch breeder.

'Debra Solomon' (Sol. 1961), R; A-673, D-5A; U-4fld; 16″ h; fls. 8″ diam; rose bengal (HCC-25/2-25), darker throat; spr. PL. 18:42. 1962.

'Deceit' (Zeiner, 1944), R; A-88; fls. 8″ diam; rose with white stripe, later changing to scarlet. Hb. 11:266. 1944.

'Decora' (VW. 1960), R; A-655, D-5; U-4fld; 20″ h; fls. 8″ diam; rose with carmine ribs, carmine blotch towards throat; e. spr. PL. 17:53. 1961.

'Deetta Pye' (Vas. 1940), R; A-89; fls. 8″ diam; red with stamens yellow at base. Hb. 6:155. 1940.

'Defiance' (V. Hou.), R; A-85. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'DeGraff' (Graaff, J. de), R; A-90. Hb. 1:47. 1934.

'Delilah' (Lud. 1954), R; A-429, D-5A; U-4fld; 25″ h; fls. 8″ diam; begonia pink (HCC-619), darker throat; spr; dec. c. Ludwig & Co. 1954. PL. 14.55. 1958.

'Diamond' (Lud. 1954), R; A-430, D-5A; U-4fld; 25″ h; fls. 9″ diam; geranium lake (HCC-20), glossy red throat; spr; dec. PL. 14:55. 1958.

'Diana', NR; HB. 1:63. 1934.

'Dido' (VM), NR; salmon rose.

'Digweedi' (Herb.), R; A-91; **A. reticulata** x **A. vittata.** Hb. 1:47. 1934.

'Display' (BM. 1958), R; A-582, D-5A; U-4fld; 18″ h; fls. 7″ diam;

vermilion (HCC-18), carmine flushing; spr. PL. 17:52. 1961.

'Dixie' (BM. 1958), R; A-583, D-5B; U-2fld; 18″ h; fls. 8½″ diam. scarlet (HCC-19) flushed white in center; spr. PL. 17:52. 1961.

'Doanes', R; A-92; zinnabar red with white edge. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Donald Mitchel' (Mitch. 1961), ℝ; A-675, D-5A; U-4fld; 22″ h; fls. 9″ diam; tyrian rose (HCC-24/1), white midrib, greenish-white throat. PL. 18:42. 1962.

'Don Camilo' (Lud.), NR; scarlet.

'Don Juan' (VM), NR; brilliant red.

'Donnii' (Herb.), R; A-93. Hb. 1:47. 1934.

'Dorathy May' (Arms. 1945), R; A-95, D-5B; fls. 9″ diam; white bordered pink. Hb. 12:104. 1945.

'Doris', R; A-94. Chitt. 1933. Hb. 1:47. 1934.

'Doris Lilian' (Lud. 1950), R; A-431, D-5B; U-4fld; 26″ h; fls. 7½″ diam; carmine rose (HCC-21), tips lighter shade, glossy red throat; spr; dec. c. Ludwig & Co. 1954. PL. 14.55. 1958.

'Drakensberg' (BM. 1958), R; A-584, D-5B; U-3fld; 18″ h; fls. 9″ diam; blood red (HCC-820). PL. 17:52. 1961.

'Dresden Beauty' (Ram. 1959), ℝ; A-544, D-4A; 22″ h; fls. 6½″ diam; white with porcelain rose (HCC-620) edging and markings; spr; dec. PL. 16:76. 1960.

'Dr. Johns' (Dug. 1958), R; A-402, D-3; 24″ h; fls. 7½″ diam; cardinal red (HCC-822); fr. PL. 14.54, 1958.

'Dr. Masters' (Will.), R; A-96, D-5; clear red; A. pardinum hybrid. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Dr. Pickard' (Pick. 1959), R; A-537, D-5A; fls. 9″ diam; dark red. PL. 16:106, f. 27. 1960.

'Duchess of Windsor' (T & H. 1938), R; A-97; pink. Hb. 5:91. 1938.

'Duke of York', R; A-103. Chitt. 1933. Hb. 1:47. 1934.

'Dulas', R; A-104; rose, deep red towards center. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Dutch Belle' (Lud. 1963), R; A-755, D-5A; U-3-4fld; 26″ h; fls. 8″ diam; rose opal (HCC-o22), darker throat; spr.

'Dutch Doll' (Lud. 1962), ℝ; A-703, D-5A; U-4fld; 24″ h; fls. 9″ diam; picotee type, pure white with red edge; spr. PL. 19:65. 1963.

'Dutch Gold' (Lud.), NR; copper color.

'Dutch Master' (W-WS. 1962), R; A-709. D-5A; U-2fld; 22″ h; fls. 7½″ diam; rose bengal (HCC-25) on white base, white edge on segs; spr. PL. 19:65. 1963.

## —E—

'Early Queen' (Lud.), NR.

'Early White' (Lud. 1948), R; A-105. U-4-5fld; 22″ h; fls. 7½″ diam; pure white. Hb. 15:69. 1948.

'Eastern Glory' (BM. 1954), R; A-585, D-5B; U-3fld; 18″ h; fls. 7″ diam; mandarin red (HCC-17), oxblood red flush towards center spr. PL. 17:52. 1961.

'Eclatante' (Ker), R; A-106, D-5; red with purple sheen. Hb. 1:47. 1934.

'Eclipse', R; A-107; white, veined red border. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Edelweiss' (Hay. 1936), R; A-108, D-5; fls. 7″ diam; pure white. Hb. 3:92. 1936.

'Edith' (Hay. 1935), ℝ; A-109. Hb. 2:92. 1935.

'Edith M. Wynne' (Veit.), R; A-110; **A. reticulata striatifolia** x **A. Leopoldii**; autm. Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Edlena' (McCann), NR; D-7; pink and white, segs keeled white. Traub, Amaryll. 90. 1958.

'Edward Hall' (Heat. 1935), NR; white with light red markings. Hb. 2:56. 1935.

'Eglamor' (Veit.), R; A-111, D-5; Nehr. Amaryll. 1909. Hb. 1:47. 1934.

'Eldorado', R; A-112. Chitt. 1933. I.—Veit. 1893. Hb. 1:47. 1934.

'Eleanor Roosevelt' (Dom. 1934), NR. Hb. 2:92. 1935.

'Elizabeth' (Camm.), NR; Traub, Amaryll. 61. 1958.

'Elizabeth Traub' (Henry, 1951), NR; D-8; U-2fld; 7″ h; carmine (HCC-21/1); **A. belladonna** var. **haywardii** x **A. espiritensis**; win; ev. PL. 7:117-118 f. 22. 1951.

'Ella Maie Stevens' (T & H, 1937), R; A-113, D-5B; U-4-6fld; 24″ h; fls. 8″ diam; white base, veined red, white midrib. Hb. 4:143. 1937.

'Elvira Aramayo' (W-WS. 1962), R; A-684, D-5A; U-4fld; 20″ h; fls. 7″ diam; carmine (HCC-21), magenta rose overlay. PL. 19:65. 1963.

'Emma Piper' (T & H, 1937), R; A-114, D-5B; U-5fld; 25″ h; fls. 8″ diam; upper three segs banded white and veined rose, lower setsegs and lower, petseg, white. Hb. 4:143. 1937.

'Empress of India' (Graaff, S. 1860), R; A-115; U-4-6fld; **A. psittacina** x cl. 'Graveana'. Hb. 1:48. 1934.

'Enchantress' (Veit.), R; A-116; rose red, striped carmine; fr. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Eola' (Heat. 1934), R; A-117; white with light red markings. Hb. 2:56, 90. 1935.

'E. P. Hall' (Heat. 1934), R; A-118. Hb. 2:90. 1935.

'Ernestine' (Hay. 1937), R; A-119, D-5B; fls. 9″ diam; lavender rose red with white keel. Hb. 4:115, PL. 58. 1937.

'Ernest Pye' (Vas. 1940), R; A-120; fls. 8″ diam; red, suffused with white towards center. Hb. 6:155. 1940.

'Ernst Ludwig' (Lud.), NR; dark red.

'Eros', R; A-121. Chitt. 1933. I.—Veit. 1896. Hb. 1:48. 1934.

'Esther' (Pfis.), R; A-122; cl. 'Dr. Masters' x **A. pardina**. Hb. 1:48. 1934.

'Eternal Youth' (Terry, 1961), R; A-676, D-5A; U-4fld; 20″ h; fls. 8″ diam; upper segs delft rose (HCC-20/1), petseg to half of tip, white; spr; cl. 'Pink Favorite' x cl. 'Ludwig Dazzler'. PL. 18:42. 1962.

'Ethel Duckworth' (Hay. 1937), R; A-123, D-5B; fls. 8″ diam; velvet red, darker in throat, seg tips lighter shade. Hb. 4:142. pla. 59:116. 1937.

'Etiole' (Sou.), R; A-124; A vittatum hybrid; yellowish white, red stripes. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Etna' (BM. 1959), R; A-586, D-5A; U-3fld; 22″ h; fls. 7½″ diam; dutch vermilion (HCC-717). PL. 17:52. 1961.

'Etta McNeel' (T & H, 1938), R; A-125; pink. Hb. 5:91. 1938.

'Eubank's White' (Eub. 1961), R; A-668, D-5A; U-4fld; 20″ h; fls. 8½″ diam; white, light chartreuse green in throat. PL. 18:42. 1962.

'Eurasian', R; A-126. Chitt. 1933. I.—Veit. 1913. Hb. 1:48. 1934.

'Evalena' (Arms. 1949), R; A-127, D-5A; fls. 9½″ diam; velvety red, white throat; fr. PL. 5:88. 1949.

**'evansiae'** (Traub & Nelson), species; three color forms—pastel pink, chartreuse, and very light yellowish; from Bolivia. Baileya 4:85-88, f. 30-31. 1956. PL. 14:29, f. 4:29. 1958. (see 'Senorita').

'Excellent', R; A-128. Chitt. 1933. I.—Veit. 1893. Hb. 1:48. 1934.

'Exhibition' (Zeiner), NR; scarlet, with white stripe. Hb. 11:256. 1944.

'Extase' (W-WS. 1962), R; A-710, D-5A; U-3fld; 36″ h; fls. 9″ diam; cardinal red (HCC-822), darker throat, bearded, ruffled edges; spr. PL. 19:66. 1963.

## —F—

'Fabiola' (VM. 1953), R; A-521. D-4; 24″ h; fls. 8″ diam; bright red. PL. 15:46. 1959.

'Fair Lady', R; A-129. Chitt. 1933. I.—Veit. 1903. Hb. 1:48. 1934.

'Fair Lady', R; A-777, D-5A; U-3fld; 18″ h; fls. 8″-9″ diam; pinpoints of vermilion (HCC-18/1) appears as solid color, blood red and light white lines; spr., dec. I.—Goed. 1962 for a Dutch breeder.

'Faith' (Heat. 1934), R; A-130; U-3fld; fls. 7½″ diam; bright red, veined darker red, red keel; ev. Hb. 1:105. 1934.

'Faith' (Park. 1955), NR; U-2fld; fls. 8″ diam; white, red border; reflexed; spr. PL. 11:62. 1955.

'Fan Tan' (Har. 1959), R; A-549, D-5A; 22″ h; fls. 8″ diam; signal red (HCC-719), white stripes forming a star, greenish throat, white border; spr; fr. PL. 16:75. 1960.

'Fantasy' (Lud. 1948), R; A-131; rose, lighter throat, margins on segs. Hb. 15:69. 1948.

'Fantasy' (Lud. 1950), R; A-432, D-5A; U-4fld; 25″ h; fls. 7½″ diam; delft rose (HCC-o20), light rose stripe on each seg, apple green throat with faint red ring deep in throat. c. Ludwig & Co. 1954. PL. 14:55. 1958.

'Fashion' (Laine, 1963), R; A-747, D-5A; U-3-4fld; 18″ fls. 7″ diam; scarlet red (HCC-19).

'Faust' (VM. 1949), R; A-522, D-4; 32″ h; fls. 8″ diam; dutch vermilion (HCC-717). PL. 15:46. 1959.

'Favorite' (Veit.), R; A-132; **A. reticulata X A. leopoldii;** autm. Hb. 1:48. 1934.

'Feline Repose' (BM. 1956), R; A587, D-5B; U-3fld; 18″ h; fls. 7″ diam; geranium lake (HCC-20), fused with white. PL. 17:52. 1961.

'Fidelity' (Lud. 1950), NR; U-3-4fld; 24″ h; fls. 7½″ diam; spinel pink (HCC-o625-o625/1). PL. 7:73. 1951.

'Fiedelio' (VE), R; A-133. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Field Marshall', R; A-134. Chitt. 1933. I.—Holf. 1906. Hb. 1:48. 1934.

'Finette' (Ker), R; A-135, D-5; white, few red stripes. Nehr. Amaryll. 1909; Hb. 1:48. 1934.

'Fire' (T & H, 1938), R; A-136; red. Hb. 5:91. 1938.

'Fire Bird', R; A-678, D-5A; U-4fld; fls. 9″ diam; orange red, darker throat, back of segs white, spotted red. I.—Goed. 1961. PL. 18:43. 1962.

'Firebrand', R; A-137. Chitt. 1933. I.—Paul, 1892. Hb. 1:48. 1934.

'First Century' (BM. 1962), NR; white, scarlet flushing.

'Fire Dance' (Lud. 1958), R; A-465, D-5A; U-4fld; 24″ h; fls. 10″ diam; dutch vermilion (HCC-717), violet red throat; spr; dec. PL. 15:43. 1959.

'Fire Fly' (Lud. 1958), R; A-469, D-8; U-4-6fld; 16″ h; fls. 4″ diam; capsicum red (HCC-715), darker throat; spr; dec. PL. 15:43. 1959.

'Fire King' (Lud.), NR; U-4fld; 18″ h; fls. 6″ diam; scarlet, deepening to medium red in throat. PL. 7:72. 1951.

'Fire King' (Camm.), NR; PL. 10:79. 1954.

'Five Star General' (Lud. 1955), R; A-434, D-5A; U-4fld; 30″ h; fls. 10″ diam; signal red (HCC-719), white star in center, dark red ring in throat; spr; dec. c. Ludwig & Co. 1955. PL. 14:55. 1958.

'Flamboyant' (W-C. 1962), R; A-726, D-5A; U-3-4fld; 16″ fls. 7″ diam; orient red (HCC-819); spr. I.—Goed. 1962. PL. 19:67. 1963.

'Flame' (Hay. 1935), NR; Hb. 2:92. 1935.

'Flame' (Schm. 1962), R; A-693, D-7; U-4fld; 20″ h; fls. 6″ diam; vermilion red (HCC-18); spr. PL. 19:66. 1963.

'Flamingo' (Whe. 1941), R; A-138, D-5A; fls. 8″ diam; rose pink, shading to shell pink. Hb. 8:92. 1941.

'Flora' (Ker), R; A-139, D-5; white, pale red border and veins. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Floralien' (W-WS. 1962), R; A-711, D-5A; U-4fld; 24″ h; fls. 8″ diam; blend of white and rose madder (HCC-23), veined rose red and white stripe on edge of segs. PL. 19:66. 1963.

'Floral Queen' (Lud. 1960), R; A-556, D-5A; U-4fld; 26″ h; fls. 8″ diam; spinel red (HCC-o625), dark veins deep in throat; spr. PL. 17:53. 1961.

'Florence Raasch' (Raa. 1960), R; A-554, D-4A; U-4fld; 26″ h; fls. 6½″ diam; rose red (HCC-724), darker in throat; spr. PL. 17:51. 1961.

'Florence Springer' (Spring. 1937), R; A-140; U-4-5fld; 24″ h; fls. 7″ diam; medium red (M & P, 2-L-8), white penciling in throat and center of segs; ev. Hb. 4:142. 1937.

'Floriade' (W-WS. 1962), R; A-712, D-5A; U-4fld; 24″ h; fls. 9″ diam; blend of white and rose pink (HCC-427), tyrian rose (727) stripes each side midrib on upper three segs. PL. 19:66. 1963.

'Florida' (Tilg. 1934), NR. Hb. 2:90. 1935.

'Florida' (BM. 1957), R; A-588, D-5B; U-2fld; 16″ h; fls. 7½″ diam; azalea pink (HCC-618), flushed white. PL. 17:52. 1961.

'Florida Beauty' (Camm.), NR. PL. 10:79. 1954.

'Florida Maid' (Hay. 1938), R; A-141, D-5; U-4fld; fls. 8″ diam; rose pink, flushed and veined on white. Hb. 5:146. 1938.

'Flower Record' (W-WS. 1959), R; A-516; 23″ h; fls. 3″ diam; deep scarlet (HCC-19). PL. 15:45. 1959.

'Flying Cloud', R; A-679, D-5A; U-4fld; fls. 8″ diam; white with green throat. I.—Goed. 1961. PL. 18:43. 1962.

'Formosa', R; A-142; **A. reticulata** hybrid. Bak. Amaryll. 1888. Hb. 1:48. 1934.

'Foster Dulles' (VW. 1960), R; A-656; U-4fld; 24″ h; fls. 8″ diam; scarlet (HCC-19). PL. 17:53. 1961.

'Francisca', R; Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Francis Drake' (BM. 1954), R; A-589, D-5B; U-3fld 18″ h; fls. 7″ diam; geranium lake (HCC-20), scarlet and signal red fused with white. PL. 17:52. 1961.

'Franklin Roosevelt' (Lud. 1954), R; A-433, D-5B; U-4fld; 25″ h; fls. 7½″ diam; currant red (HCC-821), upper segs darker, dark red throat; spr; dec. c. Ludwig & Co. 1954. PL. 14:55. 1958.

'Frank Wootten' (Traub, 1934), NR. Hb. 2:92. 1935.

'Freckles' (Zeiner, 1947), R; A-145, D-5B; white with pink spots and stripes. Hb. 14:128. 1947.

Friendship' (VM. 1956), R; A-523, D-4; 28″ h; fls. 7″ diam; salmon with a white glow. PL. 15.46. 1959.

'Frilled Queen' (Chandler), NR. SPN. 13. 1942.

'Fritz Kreisler', R; A-778, D-5A; U-4-5fld; 22″ h; fls. 6″-7″ diam; camelia rose (HCC-622-622/1); spr., dec. I.—Goed. 1962 for a Dutch breeder.

'Fuchsia Rose' (Ram. 1959), R; A-545, D-5A; 22″ h; fls. 6½″ diam; fuchsia rose; spr; dec. PL. 16:76. 1960.

'Fucinus', R; A-146; cream yellow, dotted red. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Fulda' (VW. 1958), R; A-407; U-3-4fld; 28″ h; fls. 10″ diam; orange red (HCC-19). PL. 14:55. 1958.

'Fulgens', R; A-147. Chitt. 1933. I.—Back. 1865. Hb. 1:48. 1934.

'Full Moon' (Hay. 1935), NR. Hb. 2:92. 1935.

## —G—

'Garfieldii' (GPC. 1937), R; A-148; U-4fld; orange red with star. syn: "Hippecoris Garfieldii no. 30". I.—AAS. 1937. Hb. 4:142. 1937.

'Garfield Triumph' (GPC), NR; D-3.

'Garibaldi' (VM), NR; orange red.

'Garnet King' (Zeiner), NR; solid red. Hb. 11:256. 1944.

'Gem', R; A-149. Chitt. 1933. I.—Veit. 1894. Hb. 1:48. 1938.

'Gemato' (Mull. 1962), R; A-701, D-5B; U-4fld; 15″ h; fls. 5½″ diam; blood red (HCC-820), white band around all petals; spr; fr. PL. 19:67. 1963.

'General Buller', R; A-150. Chitt. 1933. I.—Veit. 1902. Hb. 1:48. 1934.

'General Eisenhower' (VW. 1960), R; A-657, D-5A; U-3-4fld; 21″ h; fls. 7″ diam; salmon (HCC-412), darker throat. PL. 17:53. 1961.

'Gerald Ash' (BM. 1958), R; A-590, D-5B; U-3fld; 18″ h; fls. 8″ diam; geranium lake (HCC-20), flushed carmine rose and white. PL. 17:52. 1961.

'Geranium Lake' (BM. 1955), R; A-641, D-5B; U-4-5fld; 24″ h; fls. 7½″ diam; geranium lake (HCC-20), slight white flush. PL. 17:52. 1961.

'Gereant', R; A-151. Chitt. 1933. I.—Holf. 1910. Hb. 1:48. 1934.

'Gertrude' (BM. 1962), NR; creamy white, brushed in scarlet, white border.

'G. Firth' (Will.), R; A-152; 'Defiance' x **A. reticulata**; autm. Hb. 1:48. 1934.

'Ghent' (BM. 1958), R; A-591, D-5B; U-3-4fld; 18″ h; fls. 9″ diam; azalea pink (HCC-618), white star, poppy red overlay. PL. 17:52. 1961.

'Giant Goliath' (VM. 1953), R; A-524; 28″ h; fls. 9″ diam; vermilion (HCC-18). PL. 15:46. 1959.

'Giant Near White' (Camm.), NR. PL. 10:79. 1954.

'Giant Orange' (Zeiner, 1944), R; A-153; orange with white stripe. Hb. 11:266. 1944.

'Gilroy' (Brn. 1943), R; A-154; U-3fld; fls. 8″ diam; red. Hb. 10:94. 1943.

'Girl Guide' (BM. 1962), NR; vermilion, white star.

'x gladwynensis' (Henry, 1950), hybrid; U-2fld; carmine in type; **A. belladonna** var. **haywardii** x **A. johnsonii.** PL. 7:118-121, pla. 18. 1951. cl. 'Mary Davis', PL. 8:86. 1952.

'Glamour' (Whe. 1941), R; A-155, D-4B; fls. 8″ diam; white, wine red splotches upper three segs and upper half of lower setsegs. Hb. 8:92. 1941.

'Gloria' (Heat. 1938), R; A-156, D-4; light violet with darker veining shaded to light pink at tips. Hb. 5:146. 1938.

'Gloriosa', R; A-157; **A. reticulata** hybrid. Bak. Amaryll. 1888. Hb. 1:48. 1934.

'Glorious' (Heat. 1935), NR. SPN. 13. 1942.

'Gold Dust' (Zeiner, 1947), R; A-158, D-5A; fls. 8½″ diam; orange red. Hb. 14:128. 1947.

'Golden Triumphator' (W-WS. 1962), R; A-696, D-5A; U-3fld; 21″ h; fls. 9″ diam; mars orange (HCC-o13), orange and brick red blend to throat in upper 3 segs, lower segs lighter shade. PL. 19:65. 1963.

'Goliath' (Hay. 1935), NR. Hb. 2:92. 1935.

'Gondibar' (VM), NR; red.

'Gorgeous', R; A-159; carmine red, Nehr. Amaryll. 1909. I.—Veit. 1895. Hb. 1:48. 1934.

'Gowenii' (Herb.), R; A-160; **A. reticulata** x **A. elegans.** Hb. 1:48. 1934.

'Gracchus', R; A-161. Chitt. 1933. I.—Veit. 1909. Hb. 1:48. 1934.

'Grace' (Schm. 1962), R; A-696, D-5A; U-3fld; 18″ h; fls. 6″ diam; white, orient red stripes and edging on 2 upper petsegs, greenish throat. PL. 19:66. 1963.

'Gracilis Boegschoten' (VM. 1946), R; A-536, D-8; U-2fld; 18″ h; fls. 3″ diam; red. PL. 15:47. 1959.

'Grahamii' (Herb.), R; A-162; **A. johnsonii** x **A. vittata.** Hb. 1:48. 1934.

'Grand Bay' (Perr. 1962), R; A-698, D-5A; U-4fld; 18″ h; fls. 6″ diam; geranium lake (HCC-20/1), white midribs, segs dotted with reddish spots. PL. 19:66. 1963.

'Grand Mist' (Perr. 1961), R; A-674, D-4A; U-4fld; 20″ h; fls. 7″ diam; white, green throat, red markings deep in throat. PL. 18:43. 1962.

'Grand Monarch', R; A-163. Chitt. 1933. I.—Veit. 1890. Hb. 1:48. 1934.

'Graveana' (Graaff, J. de), NR;. x **A. vittata** and **A. striata** vars. **fulgida** and **crocata.** Hb. 1:48. 1934. Traub, Amaryll.:46. 1958.

'Gravinae' (Mel.), R; A-164, D-4; glowing red, banded white. Bak. Amaryll. 1888. Hb. 1:48. 1934.

'Greta Garbo' (Traub, 1934), NR. Hb. 2:92. 1935.

'Griffinii' (Grif.), R; A-165; **A. psittacina** x **A. johnsonii.** Herb, Amaryll. 1837. Hb. 1:48. 1934.

'Guardsman' (Chandler), NR; SPN. 13. 1942.

### —H—

'Haarlem' (BM. 1957), R; A-592, D-5B; U-4fld; 24″ h; fls. 7½″ diam;

vermilion (HCC-18), white on midribs. PL. 17:52. 1961.

'Haarlem' (VW. 1960), R; A-658, D-5; U-3-4fld; 21″ h; fls. 7″ diam; bishop's red, with satin red throat. PL. 17:53. 1961.

'Hades' (VM. 1962), NR; dark red. I.—Goed. 1962.

'Halley' (Lud. 1950), R; A-435, D-5B; U-4fld; 25″ h; fls. 8½″ diam; poppy red (HCC-16), dark throat and veins. PL. 7:72. 1951.

'Hannibal' (VM), NR; scarlet.

'Happy Memory' (Lud. 1963), R; A-757, D-5A; U-4fld; 32″ h; fls. 10″ diam; capsicum red (HCC-715) and white combination.

'Harlequin' (Chandler), NR. SPN. 13. 1942.

'Harrisonii' (Harr., R.), R; A-166; **A. reticulata** x **A. stylosa.** Herb. Amaryll. 1837. Hb. 1:48. 1934.

'Harry Searles' (Searles, 1934), NR; Hb. 2:92. 1935.

'Harry St. John' (St. J. 1956), R; A-391, D-5B; 20″ h; fls. 7″ diam; dark red, darker throat; spr; ev. PL. 14:54. 1958.

'Harvest Moon' (Camm.), NR; PL. 10:79. 1954.

'Haylockii' (Sweet), R; A-167; **A. elegans** x **A. striata,** Herb. Amaryll. 1837. Hb. 1:48. 1934.

'Heaven Sent' (Lud. 1963), R; A-758, D-5A; U-3fld; 22″ h; fls. 9″ diam; camelia rose (HCC-622-622/2).

'Helen' (Heat. 1934), NR. Hb. 2:90. 1935.

'Helen' (Lud. 1954), R; A-436, D-5B; U-4-5fld; 28″ h; fls. 8″ diam. begonia pink (HCC-619-619/1), white ring in throat; spr; dec. v. Ludwig & Co. 1954. PL. 14:55. 1958.

'Helen Hull' (McCann), NR; D-7. PL. 10:28, f. 2. 1954.

'Helen Jane' (Tilg. 1934), NR; light red. Hb. 2:58. 1935.

'Helen L. Heaton' (Heat. 1938), R; A-168, D-5; pure white, violet feathering on upper segs. Hb. 5:146. 1938.

'Helen Tilghman' (Tilg. 1934), NR; fls. 8″ diam; red, white star. Hb. 2:58, 90. 1935.

'Hellas' (VM. 1962), NR; stone red, white center. I. Goed. 1962.

'Hendersonii', R; A-169, D-5; Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Hendersonii Coccinea', R; A-170; **A. leopoldii** hybrid. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

x **henryae** Traub, PL. 7:117-118, f. 22. 1951; Amaryll. Man. fc. (frontispiece). 1958; fls. light pink; **A. belladonna** var. **haywardii** x **A. espiritensis.**

'Henry Nehrling' (Heat. 1934), NR. Hb. 2:90. 1935.

'Henslowii' (Herb.), R; A-171; **A. reginae** x **A. striata.** Hb. 1:48. 1934.

'Heracles' (Lud.), NR; U-4fld; 28″ h; fls. 9″ diam; oxblood red (HCC-820). c. Ludwig & Co. 1954.

'Herbertii' (Sweet), NR; pale orange. Herb. Amaryll. 1909. Hb. 1:48. 1934.

'Her Majesty' (Will.), R; A-172; cl. 'Defiance' x **A. reticulata**; autm. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Hermita' (Veit.), R; A-173, D-5; lilac red with green throat. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Hex River' (BM. 1958), R; A-593, D-5B; U-3fld; 18″ h; fls. 7″ diam; mandarin red (HCC-17). PL. 17:52. 1961.

'Hidalgo', R; A-174; orange red, shaded carmine. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Hidenley' (Str.), R; A-175; "Acramanii Pulcherrinum" x **A. reticulata**; autm. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

"Hippecoris Garfieldii", NR. (see 'August Koch').

'Holloway Belle' (Will.), R; A-176, D-5; Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Home Decorator' (Lud. 1962), R; A-702, D-5A; U-4fld; 28″ h; fls. 9″ diam; poppy red (HCC-16/1), darker throat, suffused with salmon. PL. 19:64. 1963.

'Hong Kong' (VM. 1962), R; A-720, D-5A; U-4fld; 22″ h; fls. 8″ diam; blood red (HCC-820), currant red throat, slightly bearded. PL. 19:67. 1963.

'Hon. Maurice Gifford', R; A-177. Chitt. 1933. Hb. 1:48. 1934.

'Hoodii' (Sweet), NR; **A. belladonna** x **A. reginae.** Herb. Amaryll. 1837. Hb. 1:48. 1934.

'Hookeri' (Herb.), NR; 'Gowenii' x **A. vittata.** Hb. 1:48. 1934.

'House of Orange' (VW. 1958), R; A-408; U-3-5fld; 28″ h; fls. 2″ diam; flaming orange. PL. 14:55. 1958.

—I—

'Iceberg', R; A-178. Chitt. 1933. I.—Holf. 1925. Hb. 1:48. 1934.

'Ideala' (Veit. 1897), R; A-179; creamy white with orange-scarlet dots. Nehr. Amaryll. 1909. Hb. 1:48. 1934.

'Ignacite', R; A-180; white, light green in throat, feathered red. Nehr. Amaryll. 1909. I.—Veit. 1897. Hb. 1:48. 1934.

'Ignescens', R; A-181. I.—Veit. 1865. Hb. 1:49. 1934.

'Imperator' (VM), NR; orange red.

'Imperatrice du Bresit', R; A-182. Chitt. 1933. I.—Law. 1902. Hb. 1:49. 1934.

'Impertinence' (BM. 1954), R; A-594, D-5B; U-4fld; 16″ h; fls. 7½″ diam; white, veined turkey red and blood red. PL. 17:52. 1961.

'Independence' (VW. 1962), R; A-735, D-5A; U-4fld; 26″ h; fls. 8″ diam; vermilion red (HCC-18), currant red deep in throat. PL. 19:67. 1963.

'Invincible' (Lud. 1950), R; A-437, D-5A; U-4fld; 28″ h; fls. 9″ diam; capsicum red (HCC-715), dark red throat; spr. PL. 7:72. 1951.

'Invitation' (BM. 1954), R; A-595, D-5B; U-3fld; 14″ h; fls. 7″ diam. creamy white, speckled camelia rose. PL. 17:52. 1961.

'Irene' (W-WZ. 1962), R; A-713, D-5A; U-4fld; 18″ h; fls. 8″ diam; salmon pink (HCC-619), lighter seg margins. I.—Goed. 1962. PL. 19:66. 1963.

'Iris' (Ker), R; A-183, D-5; white, pale red veins. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Istanbul' (BM. 1958), R; A-596, D5-B; U-3fld; 14″ h; fls. 7″ diam; turkey red (HCC-721), central white star. PL. 17:52. 1961.

—J—

'Jack Frost' (Zeiner, 1947), R; A-184, D-4B; white with pink stripes. Hb. 14:128. 1947.

'Jasper', R; A-186. Chitt. 1933. I.—Ker, 1906. Hb. 1:49. 1934.

'Jasper' (BM. 1954), R; A-597, D-5B; U-3fld; 20″ h; fls. 7½″ diam; shades of jasper red (HCC-o18), capsicum red flushing. PL. 17:52. 1961.

'Java' (Rice), NR; purple or magenta with pure white throat. PL. 11:84. 1955.

'Jaygee' (Arms. 1949), R; A-185, D-5B; fls. 7″ diam; light red, dark markings in throat. PL. 5:88. 1949.

'Jean Swope' (Vas. 1940), R; A-187; fls. 7″-8″ diam.; cerise red, yellowish in center. Hb. 6:155. 1940.

'Jean Van Doesburg' (BM. 1958), R; A-598, D-5B; U-3fld; 18″ h; fls. 9½″ diam; begonia (HCC-619), flushed white towards center. PL. 17:52. 1961.

'Jefferson' (Whe. 1941), R; A-188, D-4A; fls. 9″ diam; medium dark red. Hb. 8:91-92. 1941.

'Jewel Box' (BM. 1958), R; A-599; shades of salmon, brick red, scarlet, and jasper red. PL. 17:52. 1961.

'Joan of Arc' (W-WS), R; A-498; U-4-6fld; 24″ h; fls. 7½″ diam; pure glistening white with green in throat. PL. 15:45. 1959.

'John Heal' (Veit.), R; A-189. **A. leopoldii** hybrid. Hb. 1:49. 1934.

'John Ruskin', R; A-190; orange scarlet, white bands. Hb. 1:49. 1934.

x **johnsonii** (John. 1800), NR; syn: **Amaryllis braziliensis; H. vittatua** x **A. reginae.** Hb. 1:49. 1934. Nehr. Amaryll. 1909.

'John Vasku' (Vas. 1940), R; A-191; fls. 8″ diam; red, white throat and keels. Hb. 6:155. 1940.

'Joy' (VM. 1963), R.; A-770; salmon with white stripe.

'J. R. Pitcher', R; A-192. Chitt. 1933. I.—Will. 1891. Hb. 1:49. 1934.

'Julia' (VM. 1950), R; A-525, D-4; 24″ h; fls. 7½″ diam; orange red. PL. 15:46. 1959.

'Juliana' (BM. 1954), R; A-600, D-5B; U-3fld; 18″ h; fls. 8½″ diam; dutch vermilion (HCC-717), rose and flushed white. PL. 17:52. 1961.

'Julius', R; A-193. Chitt. 1933. I.—Veit. 1903. Hb. 1:49. 1934.

'Juno' (VM), NR; scarlet.

—K—

'Kansas' (Brn. 1943), R; A-194; U-3fld; fls. 8″ diam; dark red, darker red throat. Hb. 10:94. 1943.

'Karen Marlys' (Arms. 1945), R; A-195, D-5A; fls. 9″ diam; white, red pencilings in throat. Hb. 12:104. 1945.

'Katberg' (BM. 1962), NR; blood red, glossy throat.

'Katherine Auchter' (T&H, 1938), R; A-197; pink. Hb. 5:91. 1938.

'Kathleen Dobson' (BM. 1955), R; A-601, D-5B; U-3fld; 16″ h; fls. 7½″ diam; creamish white, light currant red pencil lines. PL. 17:52. 1961.

'Kathleen Ferrier' (VW. 1956), R; A-393; 28″ h; fls. 10″ diam; pure white with creamy throat. PL. 14:54. 1958.

'Kaye' (Schm. 1962), R; A-695, D-5A; U-3fld; 22″ h; fls. 6½″ diam; jasper red (HCC-o18), faint white streak center of segs; spr. PL. 19:66. 1963.

'Kay Harding' (T&H, 1938), R; A-198; pink. Hb. 5:91. 1938.

'Killarney' (Whe. 1940), R; A-199, D-5A; very dark red, darker satiny throat. Hb. 7:130. 1940.

'Kineton', R; A-200; light red with white star. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'King Gustav V1 Adolph' (VM. 1956), R; A-526, D-4; 32″ h; fls. 8″ diam; bright red. PL. 15:46. 1959.

'King of Stripes' (W-WS), R; A-499; U-3-4fld; 24″ h; fls. 5″ diam; pale pink to white, two carmine lines on each seg. PL. 15:45. 1959.

'Kirby Pink' (Hay. 1935), NR; Hb. 2:92. 1935.

'Kismet' (BM. 1955), R; A-602, D-5B; U-3fld; 22″ fld; fls. 8″ diam; white with carmine flushing and veining. PL. 17:52. 1961.

'Klein Pink' (Kl. 1956), R; A-392, D-5A; 26″ h; fls. 8″ diam; pink to tip of segs, light green throat. PL. 14:54. 1958.

'Kohinoor' (Gron.), R; A-201, D-5; lilac red ground, tips of segs and center yellowish white. cl. 'Brilliant' x **A. psittacina.** Nehr. Amaryll. 1909. Hb. 1:49; 1934.

'Kranskop' (BM. 1962), NR; currant red.

—L—

'Lady Ardilaun' (Will.), R; A-202, D-5; Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Lady Helen' (Rice, 1943), R; A-203; deep blood red. Hb. 10:149. 1943.

'Lady Howick', R; A-204. Chitt. 1933. I.—Holf. 1907. Hb. 1:49. 1934.

'Lady in Red' (Whe. 1941), R; A-205, D-5A; fls. 7½″ diam; brilliant scarlet, orange tones only in lighter parts. Hb. 8:92. 1941.

'Lady Juliet Duff', R; A-206. Chitt. 1933. I.—Lady Duff, 1929. Hb. 1:49. 1934.

'Lady Margaret' (Veit.), R; A-207. **A. reticulata** x **A. leopoldii**; autm. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Lady Winifred Gore', R; A-208. Chitt. 1933. I.—Smith, 1896. Hb. 1:49. 1934.

'Lafayette' (BM. 1954), R; A-603, D-5B; U-4fld; 16″ h; fls. 8″ diam; dutch vermilion (HCC-717), white central star. PL. 17:52. 1961.

'La Forest Morton' (Lud. 1956), R; A-390, D-5B; U-4fld; 26″ h; fls. 8″-9″ diam; china rose (HCC-o24/1) to lilac purple (o31/1) to pansy violet (o33), almost black at bottom of throat; spr. PL. 14:54, f. 8:53. 1958.

'Lakemont' (Whe. 1940), R; A-209, D-5A; solid red, darker throat, velvety texture. Hb. 7:130. 1940.

'Lamberti' (Herb.), NR; cl. 'Cartoni' x cl. 'Grahami'. Hb. 1:49. 1934.

'Laura' (Chandler), NR. SPN. 13. 1942.

'Lavaliere' (HDL. 1963), R; A-765. I.—Goed. 1964.

'Lawrence' (Brn. 1943), R; A-210; U-3fld; fls. 9″ diam; striped and spotted on white ground. Hb. 10:94. 1943.

'Leading Lady' (W-WS), R; A-500; U-3-4fld; 20″ h; fls. 7″ diam; pure white with greenish throat. PL. 15:45. 1959.

'Leah Williams' (BM. 1962), NR; soft cream, brick red.

'Lena B. Hughes' (T & H, 1937), R; A-211, D-5B; U-3fld; 28″ h; fls. 8″ diam; salmon-rose, white band in center of all segs. Hb. 4:143. 1937.

'Leo Gestel' (VM. 1963), R; A-771; salmon pink.

'Leone Schweizer' (BM.), R; A-642; pure white, carmine rose and claret rose margins. PL. 17:52. 1961.

'Leoni', R; A-212; pure white, seg tips orange red. Nehr. Amaryll. 1909. Hb. 1: 49. 1934.

'Liberator' (Lud. 1948), R; A-213; U-3-4fld; 26″ h; fls. 7″ diam; salmon-rose, rose-red throat, white mid-stripe lower petals. PL. 7:73. 1951.

'Liberty Hyde Bailey' (Lud. 1958), R; A-466, D-5A; U-4fld; 26″ h; fls. 8″-9″ diam; oriental red (HCC-819). PL. 15:43. 1959.

'Lightning' (Zeiner, 1947), R; A-214, D-4B; white, pink stripes. Hb. 14:128. 1947.

'Lightning' R; A-215. Chitt. 1933. I.—Paul, 1893. Hb. 1:49. 1934.

'Lillian' (Arms. 1949), R; A-216, D-5B; fls. 8″ diam; pink. PL. 5:88. 1949.

'Lillian Yost' (Whe. 1940), R; A-217, D-5A; fls. 8″-9″ diam; shell pink, darker rose pink feathering. Hb. 7:130. 1940.

'Lindleyi' (Herb.), NR; cl. 'Griffini x 'Carnarvoni'. Hb. 1:49. 1934.

'Lindseyi' (Hebr.), NR; **A. aulica** x **A. reticulata.** Hb. 1:49. 1934.

'Lion's Head' (BM. 1958), R; A-604, D-5B; U-2fld; 16″ h; fls. 9″ diam; currant red (HCC-821). PL. 17:52. 1961.

'Little Diamond' (W-WS, 1962), R; A-714, D-5A; U-4fld; 18″ h; fls. 8″ diam; dawn pink (HCC-523), white midrib in all segs; spr. PL. 19:66. 1963.

'Little Sweetheart' (Lud. 1958), R; A-470, D.8; U-4-5fld; fls. 4″ diam; salmon-red, soft greenish-white star-like throat, darker red streaks, spr. PL. 15:43. 1959.

'Lois', R; A-218. Chitt. 1933. I.—Holf. 1901. Hb. 1:49. 1934.

'Lord Amherst' (Whe. 1941), R; A-219, D-5A; fls. 9″ diam; dark crimson with violet tones. Hb. 8:91. 1941.

'Lord Bovington', R; A-220. Chitt. 1933. I.—Holf. 1901. Hb. 1:49. 1934.

'Lord Brassey' (Will.), R; A-221, D-5A;. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Lord Roberts', R; A-222. Chitt. 1933 I.—Will. 1895. Hb. 1:49. 1934.

'Louise Hayward' (Hay. 1940), R; A-223; snowy white, apple green shading in throat. Hb. 7:131, Plate 180:129. 1940.

'Love's Desire' (Lud. 1954), R; A-438, D-5A; U-4fld; 26″ h; fls. 9″ diam; coral pink (HCC-o619) and porcelain rose, reddish stripes; spr; dec. c. Ludwig & Co. 1954. PL. 14:55. 1958.

'Love Fire' (Lud.), NR; orange red.

'Lucifer' (W-WS, 1950), R; A-501; U-3fld; 19″ h; fls. 8″ diam; medium dark red. PL. 7:74. 1951.

'Lucky Strike' (Lud. 1957), R; A-443, D-5A; U-3-4fld; 24″ h; Oriental red (HCC-819), oxblood red throat; spr; dec. PL. 14:55. 1958.

'Ludwig's Ace' (Lud. 1959), R; A-540, D-5A; U-4fld; 23″ h; fls. 8″ diam; azalea pink, shaded light brick red with delft rose throat; spr. PL. 16:76. 1960.

'Ludwig's Dazzler' (Lud. 1957), R; A-439, D-5A; U-4fld; 26″ h; fls. 8½″ diam; pure white with nearly white throat; spr; dec. PL. 14:55. 1958.

'Ludwig's Goliath' (Lud. 1957), R; A-442, D-5A; U-4fld; 25″ h; fls. 11″ diam; orient red (HCC-819), darker throat; spr; dec. PL. 14:55. 1958.

'Ludwig's It' (Lud. 1958), R; A-467, D-5A; U-4fld; 30″ h; fls. 10″ diam; dark blood red (HCC-820), currant red throat; spr; dec. PL. 15:43. 1959.

'Ludwig's Masterpiece' (Lud. 1954), R; A-440, D-5A; U-4-5fld; 30″ h; fls. 8″ diam; dutch vermilion (HCC-717), darker throat; spr; dec. PL. 14:55. 1958.

'Ludwig's Scarlet' (Lud. 1950), R; A-441, D-5A; U-4fld; 25″ h; fls. 7½″ diam; dark blood red (HCC-820), darker in throat; spr; dec. PL. 14:55. 1958.

'Ludwig's Sensation' (Lud.), NR; U-4fld; 18″ h; fls. 7″ diam; white, greenish throat. Traub, Amaryll. Man. 82. 1958.

'Ludwig's Splendor' (Lud.), NR; U-4fld; fls. 8½″ diam; dutch vermilion (HCC-717), darker throat. c. Ludwig & Co. 1954.

'Lyso', R; A-224; white and red, veined green. Hb. 1:49. 1934.

—M—

'Mac Arthur' (Lud. 1954), NR; U-4fld; 30″ h; fls. 7½″ diam; dutch vermilion (HCC-717). c. Ludwig & Co. 1954.

'Madam Curie' (W-WZ. 1962), R; A-717, D-5A; U-3fld; 14″ h; fls. 6″ diam; shrimp red (HCC-616), veining in all segs. I.—Goed. 1962. PL. 19:66. 1963.

'Madam Van Waveren' (VW. 1962), R; A-736, D-5A; U-3-4fld; 28″ h; fls. 8″ diam; white, red pencil stripes in upper segs, lower segs white; spr. PL. 19:67. 1963.

'Madira Bickel' (McCann), NR; brick red, ruffled edges. Traub, Amaryll. Man. 90. 1958.

'Madonna' (Veit.), R; A-225. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Magic', R; A-226. Chitt. 1933. I.—Holf. 1926. Hb. 1:49. 1934.

'Magnificent', R; A-227. Chitt. 1933. I.—Ker. 1909. Hb. 1:49. 1934.

'Magnolia' (BM), R; A-643, large white. PL. 17:52. 1961.

'Maiden's Blush' (Camm.), NR. PL. 10: 79. 1954.

'Major Wilson', R; A-228, D-5; dark red ground color, tips creamy white; 'Brilliant' x **A. psittacina.** Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Malay Star' (BM. 1955), R; A-644, D-5B; U-4fld; 16″ h; fls. 7½″ diam; rose opal (HCC-o22), white central star. PL. 17: 52. 1961.

'Maluti' (BM. 1959), R; A-605, D-5B; U-3fld; 21″ h; fls. 9″ diam; cardinal red (HCC-822). PL. 17:52. 1961.

'Mandarin's Joy' (BM. 1955), R; A-606, D-5B; U-4fld; 20″ h; fls. 8″ diam; mandarin red (HCC-17). PL. 17: 52. 1961.

'Mandarin's Pride' (BM. 1954), R; A-607, D-5B; U-2fld; 18″ h; fls. 7½″ diam; light mandarin red (HCC-17). PL. 17:52. 1961.

'Mansore' (VM.); NR; crimson-purple.

'Marathon', R; A-229. Chitt. 1933. I.—Veit. 1901. Hb. 1:49. 1934.

'Marcelle' (Hay. 1938), R; A-230, D-5; U-4fld; fls. 8″ diam; deep red self. Hb. 5:146. 1938.

'Marcus', R; A-231. Chitt. 1933. I.—Veit. 1909. Hb. 1:49. 1934.

'Margaret Pomfret' (Gron.), R; A-232, D-5; dark red, seg tips creamy white. cl. 'Brilliant' x **A. psittacina.** Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Margaret Rose' (Camm.), NR; PL. 10:79. 1954.

'Margaret Rose' (Lud. R; A-444, D-5A; U-4fld; 28″ h; fls. 8″-9″ diam; shrimp red (HCC-616/3) striped, mandarin red on upper segs, begonia rose on lower segs. PL. 14:55. 1958.

'Miss Margaret Truman' (Lud. 1954), R; A-446, D-5A; U-4fld; 28″ h; fls. 8″ diam; porcelain rose (HCC-620), camelia rose reflection, darker throat; spr; dec. PL. 14:55. 1958.

'Margie Clements' (Clem. 1957), R; A-401, D-7; U-4fld; 22″ h; fls. 5½″ diam; dutch vermilion (HCC-717), segs pointed and reflexed. PL.

14:54. 1958.

'Marginata', R; A-233; **A. elegans** hybrid. Bak. Amaryll. 1888. Hb. 1:49. 1934.

'Marginatum Conspicum' (V. Hou.), R; A-234. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Marginatum Venustum' (V. Hou.), R; A-235. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Maria Goretti' (Lud. 1950), R; A-445, D-5B; U-4fld; 24″ h; fls 9″ diam; pure white, greenish throat; spr; dec. PL. 14:55. 1958.

'Marie' (Heat. 1934), NR; U-4fld; fls. 11″ diam; pink with white markings; ev. Hb. 1:105. 1934.

'Marie Ash' (BM. 1958), R; A-608, D-5B; U-3fld; fls. 7½″ diam; scarlet (HCC-19), flushed white towards center. PL. 17:52. 1961.

'Marina' (Traub, 1936), R; A-236, D-5B; fls. 10½″ diam; white with pink markings. Hb. 3:92. 1936.

'Marion' (Pfis.), R; A-237; 'Dr. Masters' x **A. pardina.** Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Marion' (W-WS. 1962), R; A-682, D-5A; U-4fld; 23″ h; fls. 8½″ diam; ruffled white with rose pencil stripes in top petals; spr. PL. 19:65. 1963.

'Marjory', R; A-238. Chitt. 1933. I.—Holf. 1906. Hb. 1:49. 1934.

'Mars' (Hay. 1935), NR. Hb. 2:92. 1935.

'Mars', R; A-239. Chitt. 1933. I.—Paul, 1892. Hb. 1: 49. 1934.

'Mars' (VM. 1962), R; A-721, D-5A; U-4fld; 28″ h; fls. 9″ diam; currant red (HCC-821), darker throat; spr. PL. 19:67. 1963.

'Martinique' (Bur. 1909), R; A-240; fls. 9″ diam; Hb. 9:154, f. 78:153. 1942.

'Mary Davis' (Hay. 1937), R; A-241, D-5B; fls. 8″ diam; pure white, light green throat. Hb. 4: f., 106. 1937.

'Mary Davis', NR; cl. of **Amaryllis** x **gladwynsis,** which see under x **gladwyensis.** PL. 8:86. 1952.

'Maryland' (W-WS. 1962), R; A-687, D-5A; U-2-3fld; 20″ h; fls. 7½″ diam; begonia (HCC-619) shading to scarlet, lower segs begonia with white veins; spr; PL. 19:65. 1963.

'Mary McCann' (McCann), NR; D-7; delicate shade of pink, veined white, Traub, Amaryll. Man. 89, 90. 1958.

'Maryon' (Lud.), NR; U-3fld; fls. 6″ diam; dutch vermilion (HCC-717/2). PL. 10:35. 1954.

'Matopos' (BM. 1962), NR; blood red.

'Matrooskop' (BM. 1962), NR; blood red.

'McCann's Double' (McCann), R; A-242; shades of red. Hb. 9:211. 1942.

'Melanie' (BM. 1958), R; A-609, D-5B; U-4fld; 16″ h; fls. 7″ diam; scarlet (HCC-17). PL. 17:52. 1961.

'Melpomene' (Ker), R; A-243, D-5; reddish white, veined red. Hb. 1:49. 1934.

'Mendeli', NR; **A. aulica** hybrid. Bak. Amaryll. 1888. Hb. 1:49. 1934.

'Menelik' (Chandler), NR; SPN. 13. 1942.

'Mephisto', R; A-244; lilac red. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Mephisto' (Heat. 1934), NR; syn: "War". SPN. 13. 1942.

'Meteor' (Veit.), R; A-98. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Meteor' (BM. 1959), R; A-645, D-5B; U-3fld; 16″ h; fls. 8″ diam; vermilion (HCC-18), mandarin red influence; spr. PL. 17:52. 1961.

'Midorella' (VM.), NR; dark violet rose.

'Milton' (Veit.), R; A-99. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Minerva' (Ker), R; A-100, D-5; red ground color, white band and white veins. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Minerva' (VM. 1962), R; A-744, D-5A; U-4fld; 16″ h; fls. 7″ diam; delft rose (HCC-o20), pencil stripes and pinpoints delft rose; spr. PL. 19:67.

1963.

'Miss Annie' (Schm. 1962), R; A-697, D-5A; U-4fld; 18″ h; fls. 6″ diam; currant red (HCC-821); spr. UL. 19:66. 1963.

'Mme. Modjeska' (Gron.), R; A-101, D-5; dark red ground color, seg tips creamy white, greenish throat. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Model' (Ker), R; A-102, D-5; creamy white, red stripes and veining. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Modern Times' (VW. 1956), R; A-396; 28″ h; fls. 8″-10″ diam; deep blood red (HCC-820). PL. 14:54. 1958.

'Mohawk', R; A-680, D-5A; U-4fld; fls. 9″ diam; solid light red. I.—Goed. 1961. PL. 18:43. 1962.

'Mona Lisa' (Lud. 1948), R; 245; U-3-4fld; 15″ h; fls. 5½″ diam; salmon, suffused pink. PL. 7:72. 1951.

'Monarch', NR. Hb. 1:63. 1934.

'Mont Blanc' (Kenny, 1940), R; A-246; White. Hb. 7:132, f. 52. 1940.

'Montezuma' (Nehr.), R; A-247; 39″ h; fiery orange red with yellow star. **A. belladonna** x cl. 'Empress of India' Hb. 1:49. 1934.

'Mooiriver' (BM. 1962), NR; mandarin red with white.

'Moreno' (W-WS), R; A-502; 26″ h; fls. 8″ diam; medium dark red, tinge of rose in throat. PL. 15:45. 1959.

'Morning Kiss' (VW. 1957), R; A-409; 28″ h; fls. 8″-10″ diam; salmon pink. PL. 14:55. 1958.

'Morning Star' (Lud.), NR; U-3-4fld; 30″ h; fls. 8″ diam; begonia pink (HCC-619), white star with red ring deep in throat. c. Ludwig & Co. 1954.

'Mother' (Heat. 1934), NR; U-3-4fld; fls. 8½″ diam; dark wine red, veined rich purple; ev. Hb. 2:90. 1935.

'Mothersday' (Lud. 1950), R; A-447, D-5A; U-3-4fld; 30″ h; fls. 9″ diam; mandarin red (HCC-17), violet reflection in center, darker throat. PL. 7:74. 1951.

'Mount Blanc' (W-WZ. 1962), R; A-718, D-5A; U-2fld; 18″ h; fls. 6″ diam; pure white, segs ruffled with light green throat. I.—Goed. 1962. PL. 19:66. 1963.

'Mount Everest' (W-WS. 1962), R; A-715, D-5A; U-3fld; 20″ h; fls. 8½″ diam; blend of white, orient pink, and china rose. PL. 19:66. 1963.

'Mount Tacoma' (W-WS), R; A-503; 24″ h; fls. 7″ diam; pure white, faint green tinge in throat. PL. 15:45. 1959.

'Mozart', NR; fire red. I.—Goed. 1962 for a Dutch breeder.

'Mrs. Bilney, R; A-248; white dotted red. Nehr. Amaryll. 1909. I.—Veit. 1902. Hb. 1:49. 1934.

'Mrs. Burbank' (Bur. 1901), R; A-249; fls. 8″ diam; Hb. 9:154. 1942.

'Mrs. Carl Jay' (Jay), R; A-250. Nehr. Amaryll. 1909. Hb. 1:49. 1934.

'Mrs. Cleveland' (Pfis), R; A-251; rose red. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Mrs. Donald Dudley' (Heat. 1934), NR; Hb. 2:90. 1935.

'Mrs. Garfield' (Veit.), R; A-252. **A. reticulata** x cl. 'Defiance'; autm. I.—Clarke, 1928. Hb. 1:50. 1934.

'Mrs. I. W. Heaton' (Camm.), NR. PL. 10:79. 1954.

'Mrs. Lamberton' (Heat. 1934), NR; Hb. 2:90. 1935.

'Mrs. Lancaster' (Lanc. 1940), R; A-253, D-8; U-4fld; 24″ h; fls. 4″ diam; rose red, darker veining and white stripe. **A. stylosa** x **A. reticulata** striatifolia, Mrs. Garfield. Hb. 6:205. 1939.

'Mrs. Lee' (Veit.), R; A-254. **A. reticulata** hybrid; autm. Hb. 1:50. 1934.

'Mrs. Montefiore', R; A-255; white. Nehr. Amaryll. 1909. I.—Veit. 1895. Hb. 1: 50. 1934.

'Mrs. R. W. Wheeler' (T&H, 1938), R; A-256; red. Hb. 5:91. 1938.

'Mrs. T. R. Robinson' (T&H, 1938), R; A-257; pink. Hb. 5:91. 1938.

'Mrs. Wm. Lee' (Will.), R; A-258. progeny of **A. reticulata** x 'Defiance';

autm. Hb. 1:50. 1934.

'Munroi' (Col.), NR; **A. psittacina** x **A. belladonna.** Herb. Amaryll. 1837. Hb. 1:50. 1934.

'Murillo', R; A-259. Chitt. 1933. I.—Holf. 1899. Hb. 1:50. 1934.

'Muscatel' (HDL. 1963), R; A-766, D-5B; U-4fld; 10″ h; fls. 7″ diam; rose red (HCC-724/2), darkens slightly in throat.

'Musigny', R; A-260. Chitt. 1933. I.—Roths. 1912. Hb. 1:50. 1934.

'Mysterie' (W-WS), R; A-504; U-4fld; 20″ h; fls. 7″ diam; rose red, darker throat. PL. 15:45. 1959.

—N—

'Narcissa' (Nort. 1951), R; A-263, D-4B; U-2fld; fls. 8″ diam; medium red (M&P 42-L-1), veined and dotted darker red. PL. 7:76. 1951.

'Nautch Girl' (Chandler), NR; SPN. 13. 1942.

'Navala', R; A-261. Chitt. 1933. I.—Veit. 1898. Hb. 1:50. 1934.

'Neel' (Schm. 1962), R; A-694, D-5A; U-4fld; 20″ h; fls. 7″ diam; orient red (HCC-819), green throat. PL. 19:66. 1963.

'Nestor' (Ker), R; A-262, D-5; red with white tips. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Nevoso' (Hay. 1935), NR. Hb. 2:92. 1935.

'New Orleans' (BM. 1956), R; A-646, D-5A; U-3fld; 20″ h; fls. 7½″ diam; dawn pink, camelia rose, porcelain rose, begonia pink tips and white midribs. PL. 17:52. 1961.

'New Pink Pearl', R; A-264. Chitt. 1933. I.—Holf. 1926. Hb. 1:50. 1934.

'Nimrod', R; A-265. Chitt. 1933. I.—Veit. 1893. Hb. 1:50. 1934.

'Nivalis' (Lud. 1954), R; A-448, D-5B; U-3-4fld; 24″ h; fls. 8″ diam; pure white with faint greenish throat; spr; dec. PL. 14:55. 1958.

'Norma', R; A-267; shade of red and white. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Northern Queen' (VW. 1957), R; A-410; fls. 8″-10″ diam; 28″ h; salmon-orange, carmine-red towards center. PL. 14:55. 1958.

'Novelty', R; A-268. Chitt. 1933. I.—Paul, 1894. Hb. 1:50. 1934.

'Nysa', R; A-269. Chitt. 1933. I.—Veit. 1902. Hb. 1:50. 1934.

—O—

'Oasis' (W-WS. 1962), R; A-685, D-5B; U-3-4fld; 21″ h; fls. 7½″ diam; pure white with greenish throat; spr. PL. 19:65. 1963.

'O'Brien' (O'Bri.), NR; **A. pardina** x **A. reticulata**; autm. Hb. 1:50. 1934.

'Olympia', R; A-273. Chitt. 1933. I.—Veit. 1894. Hb. 1:50. 1934.

'Ophelia' (Will.), R; A-274, D-5; Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Orange Beauty' (VW. 1960), R; A-659, D-5A; fls. 7″ diam; orange, cardinal red ribs, darker throat. PL. 17:53. 1961.

'Orangedale' (HDL. 1962), R; A-728, D-5A; U-4fld; 19″ h; fls. 6½″ diam; capsicum red (HCC-715), darker throat. I.—Goed. 1962. PL. 19:67. 1963.

'Orange Favorite' (W-WS. 1962), R; A-689, D-5A; U-3-4fld; 15″ h; fls. 6½″ diam; indian orange (HCC-713), glowing red throat; spr. PL. 19:65. 1963.

'Orange Fire' (Lud.), NR; U-4fld; fls. 8½″ diam; mandarin red (HCC-17). c. Ludwig & Co. 1954.

'Orange King' (Heat. 1934), NR; Hb. 2:90. 1935.

'Orange King' (Lud. 1948), R; A-270; fls. 8″ diam; dutch vermilion (HCC-717), brilliant red throat. Hb. 15:69. 1948. c. Ludwig & Co. 1954.

'Orange King' (W-WS. 1950), R; A-505; U-4fld; 18″ h; fls. 8″ diam; light red. PL. 15:45. 1959.

'Orange Nassau' (W-WZ. 1962), R; A-716, D-5A; U-3fld; 18″ h; fls. 7″ diam; burnt orange (HCC-o14). I.—Goed. 1962. PL. 19:66. 1963.

'Orange Perfection' (Heat. 1935). SPN. 13. 1942.

'Orange Wonder' (Lud.), NR; fls. 9″ diam; poppy red (HCC-16-16/1) to orange (HCC-12). c. Ludwig & Co. 1954.

'Orange Wonder' (W-WS. 1962), R; A-690, D-5A; U-3-4fld; 17″ h; fls. 8″ diam; indian orange (HCC-713) blending to capsicum red. PL. 19:65. 1963.

'Orchid' (Heat. 1934), NR;. Hb. 2:90. 1935.

'Oriflamme' (Sou.), R; A-271. **A. vittata** hybrid. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Orlando' (Heat. 1934), NR; white with light red markings. Hb. 2:56, 90. 1935.

'Orlando Salmon' (Heat. 1936), R; A-272, D-5A; light salmon, darker throat. Hb. 3:92. 1936.

'Osceola' (Tilg. 1934), NR; Hb. 2:90. 1935.

'Osiris' (VM. 1962), R; A-722, D-5A; U-4fld; 24″ h; fls. 8½″ diam; orient red (HCC-819), blood red throat. PL. 19:67. 1963.

'Otto Felix' (Dorr, 1962), R; A-700, D-5B; U-4fld; 23″ h; fls. 6½″ diam; delft rose and white, greenish throat; fr; spr. PL. 19:66. 1963.

'Ouverture', R; A-779, D-5A; U-3-4fld; 16″ h; fls. 7″ diam; white with light green throat; spr; dec. I.—Goed. 1962 for a Dutch breeder.

### —P—

'Palatka' (Tilg. 1934), NR; fls. 9½″ diam; pink and white. Hb. 2:58, 90. 1935.

'Pallas' (VM. 1962), R; A-745, D-5A; U-4fld; 13″ h; fls. 8½″ diam; scarlet red pinpoints to solid color at ends of tips, greenish-white throat, color mostly in upper segs. PL. 19:67. 1963.

'Pamela' (Lud. 1960), R; A-559, D-8; U-5-6fld; 20″ h; fls. 3″ diam; capsicum red (HCC-715), uranium green star in throat. PL. 17:53. 1961.

'Paprika' (BM. 1958), R; A-610, D-5B; U-4fld; 18″ h; fls. 7½″ diam; capsicum red (HCC-715), vermilion influence. PL. 17:52. 1961.

'Pardinum', NR; Chitt. 1933. I.—Veit. 1867. Hb. 1:50. 1934.

'Pardy' (Hay. 1935), NR. Hb. 2:92. 1935.

'Parkeri' (Herb.), NR. **A. striata** x **A. reticulata.** Hb. 1:50. 1934.

'Parsifal' (VM. 1962), NR; bright red orange glow. I.—Goed. 1962 for a Dutch breeder.

'Peace' (Heat. 1934), NR; U-4fld; fls. 8″ diam; white with delicate pink markings; fr. Hb. 1.105. 1934.

'Peacefulness' (Lud.), R; A-449, D-5A; U-3-4fld; 28″ h; fls. 8″ diam; blood red (HCC-820), carmine red glow, dark red throat; spr; dec. PL. 14:55. 1958.

'Pearl Maiden', R; A-275. Chitt. 1933. I.—Holf. 1906. Hb. 1:50. 1934.

'Peppermint' (Lud. 1960), R; A-669, D-5A; U-4-6fld; 26″ h; fls. 8″-9″ diam; pure white, cardinal red stripes, greenish white throat; spr; dec. PL. 18:41. 1962.

'Peppy' (Lat. 1963), R; A-749, D-5A; U-3-4fld; 16″ h; fls. 6″-7″ diam; white base with geranium lake (HCC-20) stripes, more color in upper segs.

'Pera' R; A-276. Chitt. 1933. I.—Veit. 1897. Hb. 1:50. 1934.

'Personality', R; A-780, D-5B; U-4fld; 28″ h; fls. 8″ diam; vermilion (HCC-18) with darker red markings deep in throat; spr., dec. I.—Goed. 1962 for a Dutch breeder.

'Picardy' (BM. 1957), R; A-611, D-5B; U-3fld; 24″ h; fls. 9″ diam; poppy red (HCC-16), white star in center. PL. 17:52. 1961.

'Picotee' (Lud. 1958), NR; U-4-5fld; 24″ h; fls. 10″ diam; pure white, speckled with red spots, picotee edge. c. Ludwig & Co. 1958.

'Picta' R; A-277. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Picture' (Lud. 1958), R; A-471, D-8; U-4fld; 18″ h; fls. 4″ diam; orient red (HCC-819), white star, light red throat; spr; dec. PL. 15:44. 1959.

'Pink Azalea' (BM. 1954), R; A-612, D-5B; U-3fld; 14″ h; fls. 9″ diam; azalea pink (HCC-618). PL. 17:52. 1961.

'Pink Beauty' (Ker), R; A-278, D-5; light red rose with white star. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Pink Beauty' (W-WS. 1962), R; A-719, D-5A; U-3-4fld; 20″ h; fls. 7″ diam; rose pink (HCC-427) with white upper 3 segs, lower segs white with orient pink (416/3). PL. 19:66. 1963.

'Pink Blossom', R; A-279. Chitt. 1933. I.—Holf. 1925. Hb. 1:50. 1934.

'Pink Favorite' (Lud. 1948), R; A-280; pure pink. Hb. 15:69. 1948.

'Pink Favorite' (Lud. 1958), R; A-450, D-5B; U-3-4fld; 30″ h; fls. 9″ diam; camelia rose (HCC-622), tips lighter rose, darker throat; spr; dec. PL. 14:55. 1958.

'Pinkie', R; A-281. Chitt. 1933. I.—Holf. 1909. Hb. 1:50. 1934.

'Pink Pearl' (Whe. 1940), R; A-282, D-5A; fls. 8″ diam; pure pink, darker pink in throat with pale green. Hb. 7:130. 1940.

'Pink Pearl' (Ker), R; A-283, D-5; red rose. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Pink Perfection' (Lud. 1950), R; A-451, D-5A; U-4fld; 28″ h; fls. 8″ diam; rose opal (HCC-o22), carmine rose tips, PL. 14:55. 1958.

'Pink Reflection' (BM. 1955), R; A-647, D-5B; U-3fld; 17″ h; fls. 7½″ diam; camelia rose, crimson, rose opal, with white. PL. 17:52. 1961.

'Pinksterflower' (Lud. 1954), R; A-452, D-5A; U-4-5fld; 27″ h; fls. 8″ diam; azalea pink (HCC-618), poppy red reflection; spr; dec. PL. 14:55. 1958.

'Pink Tipped' (Zeiner), NR; frosted ground color. Hb. 11:256. 1944.

'Pinzoon', R; A-284; deep scarlet red. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Piquant', R; A-781, D-5A; U-4-5fld; 25″ h; fls. 7″ diam; dutch vermilion (HCC-717) on white base, lower segs almost white, white border on all segs; spr., dec. I.—Goed. 1962 for a Dutch breeder.

'Pirlotti' (H & S), R; A-285. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Pixie' (Lud. 1960), R; A-560, D-8; U-5-6fld; 22″ h; fls. 2½″ diam; orange (HCC-12), lighter towards base, greenish throat. PL. 17:54. 1961.

'Polar Light' (VW. 1962), R; A-738, D-5A; U-4fld; 14″ h; fls. 6″-7″ diam; dazzling white, pale green throat. PL. 19:67. 1963.

'Pola Negri' (VW. 1962), R; A-737, D-5A; U-3-4fld; 17″ h; fls. 7″-8″ diam; indian lake red (HCC-826). PL. 19:67. 1963.

'Polar Night' (VW. 1960), R; A-665, D-5A; U-2-3fld; 20″ h; fls. 7″ diam; snow white, green luster and green throat. PL. 17:53. 1961.

'Polly Anderson' (BM. 1962), NR; brick red to shrimp red.

'Pomona' (Bur. 1913), R; A-286; U-4-7fld; fls. 7½″ diam; fiery blooms, narrow white stripe to 4 segs. Hb. 9:154. 1942.

'Portola' (Bur. 1913), R; A-287; U-4fld; fls. 9″ diam; pure white, ground-lined and flaked carmine. Hb. 9:154. 1942.

'Poussin' (VW. 1960), R; A-660, D-5A; U-3-4fld; 22″ h; wine red with satin finish, crimson throat. PL. 17:53. 1961.

'Praeclara', R; A-289. A reticulatum hybrid. Bak. Amaryll. 1888. Hb. 1:50. 1934.

'President Benes' (Vas. 1940), R; A-290; fls. 7″ diam; stoplight shade of red. Hb. 6:155. 1940.

'President Carnot', R; A-291. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'President Roosevelt' (Heat. 1934), NR; orange red, white star in center. Hb. 2:90, f.:55. 1935.

'Pretoria' (S.-Afr. NH, 1947), R; A-292. Hb. pl. p. 21. 1945 (1947).

'Priam' (Whe. 1940), R; A-293, D-5A; fls. 8″-9″ diam; light red on salmon. Hb. 7:130. 1940.

'Prima Donna' (Lud. 1959), R; A-541, D-5A; U-4fld; 28″ h; fls. 9″ diam; begonia rose (HCC-619), azalea pink and rosey red throat; spr; dec. PL. 16:76. 1960.

'Prince Edward', R; A-294. Chitt. 1933. I.—Veit. 1895. Hb. 1:50. 1934.

'Prince of Orange' (V. Hou.), R; A-295. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Prince of Orange' (W-WS), R; A-506; U-3-4fld; 19″ h; fls. 8″ diam; orange, blending to scarlet in throat. PL. 15:45. 1959.

'Princess Elizabeth' (T & H, 1937), R; A-296, D-4B; U-3fld; 27″ h; fls. 7″ diam; brilliant coronation red, greenish-white star, royal purple penciling at base of petals. Hb. 4:143. 1937.

'Princess Elizabeth' (Camm.), NR; PL. 10:79. 1954.

'Princess Osra', R; A-297. Chitt. 1933. I.—Holf. 1898. Hb. 1:50. 1934.

'Prins Willem' (BM. 1954), R; A-163, D-5B; U-2fld; 18″ h; fls. 8½″ diam; burnt orange (HCC-oo14), salmon and begonia, flush of cream. PL. 17:52. 1961.

'Prof. Koch', R; A-298. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Progress' (Ker), R; A-299, D-5; shining red. Hb. 1:50. 1934.

'Profusion' (Bur. 1903), R; A-288; **A. vittata x a. johnsonii** Hb. 9:154. 1942.

'Progress', NR. Hb. 1:63. 1934.

'Pulcherrima' (Garr. 1850), R; A-300; **A. aulica x a. johnsonii**; syn: **A. xacramanii pulcherrima.** Hb. 1:46. 1934.

'Pulchrum', NR. Chitt. 1933. I.—Veit. 1873, Hb. 1:50. 1934.

'Puniceum Ignescens', R; A-301. Chitt. 1933, I.—Preston, 1928. Hb. 1:50. 1934.

'Pure Pink' (VW. 1960), R; A-661, D-5A; fls. 7″ diam; dark pink, carmine red ribs and throat. PL. 17:53. 1961.

'Purity', R; A-302. I.—Burns, 1908. Hb. 1:50. 1934.

'Purity' (Hay. 1935), NR. Hb. 2:92. 1935.

'Purple Queen' (VM. 1949), R; A-527, D-4; fls. 7″ diam; dark red to purple. PL. 15:46. 1959.

## —Q—

'Queen Alexandra', R; A-304. Chitt. 1933. I.—Veit. 1902. Hb. 1:50 1934.

'Queen Mary', R; A-305. Chitt. 1933. I.—Ker, 1911. Hb. 1:50. 1934.

'Queen of Scarlets' (VW), R; A-411; U-4-5fld; 24″ h; fls. 8″ diam; brilliant scarlet. PL. 14:55. 1958.

'Queen of Sheba' (Whe. 1942), R; A-306, D-5A; salmon red shading to darker tones in throat. Hb. 9:123. 1942.

'Queen of Sheba' (VM. 1958), R; A-528; 24″ h; fls. 7½″ diam; pink, darker shade in throat. PL. 15:47. 1959.

'Queen of Spots' (Bon.), R; A-303; **A. pardina** hybrid. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Queen of the Pinks' (VM. 1957), R; A-530; 24″ h; fls. 7″ diam; soft camelia pink. PL. 15:47. 1959.

'Queen of the Whites, (W-WS), R; A-507; U-4-5fld; 25″ h; fls. 9″ diam; waxy-white, faint green tint in throat. PL. 15:45. 1959.

'Queen Rose' (VM), R; A-531; 24″ h; fls. 7″ diam; light red to rose white, star in center. PL. 15:46. 1959.

'Queen's Page' (W-WS.), R; A-508; U-4fld; 20″ h; fls. 8″ diam; salmon orange. PL. 7:72., f. 13:73. 1951.

'Queen Superiora' (VM. 1948), R; A-529; 22″ h; fls. 7″ diam; dark red. PL. 10: f. 10:71. 1954. PL. 15:47. 1959.

## —R—

Radiance' (BM. 1959), R; A-614, D-5B; U-2fld; 18″ h; 7½″ diam; deep bright scarlet (HCC-19). PL. 17:52. 1961.

'Ralph Wheeler' (Heat. 1934), NR. Hb. 2:90. 1935.

'Ray V. Denslow' (Lud.), NR; U-4fld; 30″ h; fls. 7½″ diam; capsicum red (HCC-715), darker throat. c. Ludwig & Co. 1954.

'Reba Cooper' (T & H, 1938), R; A-307; pink. Hb. 5:91. 1938.

'Red Champion' (VW), R; A-112; U-4fld; 22″ h; fls. 8″-9″ diam; brilliant red. PL. 14:55. 1958.

'Red Emperor' (Heat. 1935), NR. SPN. 13. 1942.

'Red Emperor' (VM), NR; clear red.

'Red Guard' (Lud. 1948), R; A-308; beautiful red. Hb. 15:69. 1948.

'Red Guard' (VW), R; A-413; U-4-5fld; 24″ h; fls. 9″ diam; deep scarlet. PL. 14:55. 1958.

'Red Lion' (VW), R; A-414; U-4fld; 22″ h; fls. 8″ diam; dark red. PL. 14:55. 1958.

'Red Majesty' (W-WS. 1955), R; A-550, D-5A; 24″ h; fls. 10″ diam; red with frosty sheen; spr; dec. PL. 16:76. 1960.

'Red Master' (W-WS. 1950), R; A-551, D-5A; U-2-3fld; 24″ h; fls. 11″-12″ diam; dark red; spr; dec. PL. 16:76. 1960.

'Red Shank' (VW. 1963), R; A-772. Red.

'Red Sparkle' (Lud.), NR; U-3-4fld; 34″ h; fls. 9″ diam; dutch vermilion (HCC-717), darker throat; la. spr; dec. c. Ludwig & Co. 1954.

'Red Sunset' (Heat. 1936), R; A-309, D-5A; blood red, veined with darker keel. Hb. 3:92. 1936.

'Red Wing' (Heat. 1934), R; A-310, Hb. 2:90. 1935.

'Rembrandt' (VM. 1962), R; A-751, D-5A; U-4fld; 16″ h; fls. 7″ diam; signal red (HCC-719), glossy throat. I.—Goed. 1962.

'Rex' (Arms. 1945), R; A-311, D-5B; fls. 9″ diam; dark red, light green star in center. Hb. 12:104. 1945.

'Rialto', R: 312. Chitt. 1933. I.—Veit. 1901. Hb. 1:50. 1934.

'Rilona' (VM. 1962), R; A-723, D-5B; U-4-6fld; 23″ h; fls. 8″ diam; shrimp red (HCC-616/1), darker shade in throat. PL. 19:67. 1963.

'Robespierre' (BM. 1954), R; A-615, D-5B; U-3fld; 18″ h; fls. 9″ diam; white with delft rose brushing. PL. 17:52. 1961.

'Robin', R; A-313. Chitt. I.—Holf. 1899. Hb. 1:50. 1934.

'Rocket' (HDL. 1963), R; A-767, D-5A; U-3-4fld; 12″ h; fls. 7″ diam; rose red (HCC-724/1), purple tinge, green throat blending to white midrib halfway up segs. I.—Goed. 1963.

'Ronda', R; A-314; white ground with little red. Nehr. Amaryll. 1909. I. Veit. 1904. Hb. 1:50. 1934.

'Rosalind', R; A-315. Chitt. 1933. I.—Veit. 1896. Hb. 1:50. 1934.

'Rosaline' (HDL. 1962), R; A-729, D-5A; U-2fld; 19½″ h; fls. 7½″ diam; mottled magenta rose (HCCo27/3). I.—Goed. 1962. PL. 19:67. 1963.

'Rose Beauty' (VW. 1960), R; A-662, D-5A; U-3fld; fls. 7″ diam; cyclamen rose with crimson red blotch in throat. PL. 17:53. 1961.

'Rosedale' (HDL. 1963), R; A-768, D-5A; U-2-4fld; 11″ h; fls. 6″ diam; turkey red (HCC-721), darker in throat. I.—Goed. 1963.

'Rose du Barry', R; A-316. Chitt. 1933. I.—Roths. 1912. Hb. 1:50. 1934.

'Rose Lace' (BM. 1955), R; A-616, D-5A; U-4fld; 20″ h; fls. 7½″ diam; rose madder (HCC-23), white star along midribs. PL. 17:52. 1961.

'Roselinde' (Lud.), R; A-453; U-3-4fld; 22″ h; fls. 7″ diam; carmine rose (HCC-621-621/1), greenish-white throat. c. Ludwig & Co. 1954.

'Rose Madder', R; A-319. Chitt. 1933. I.—Ker, 1906. Hb. 1:50. 1934.

'Rosemarie' (Heat.), NR; light red, yellowish star. Hb. 2:56. 1935.

'Rose Marie' (Arms. 1945), R; A-317, D-5B; fls. 9″ diam; pink, white throat white midrib halfway up segs. Hb. 12:104. 1947.

'Rose Marie' (VM. 1962), R; A-724, D-5A; U-4-5fld; 24″ h; fls. 8″ diam; carmine rose (HCC-621), light midrib halfway up segs. PL. 19:67. 1963.

'Rosemary', R; A-318. Chitt. 1933. I.—Roths. 1931. Hb. 1:50. 1934.

'Rose Perfection' (Ker), R; A-320, D-5; rose red. Hb. 1:50. 1934.

'Rose Queen' (VW. 1949), R; A-415; U-3-4fld; 24″ h; fls. 8″ diam; old rose, darker throat. PL. 14:55. 1958.

'Rose Violet' (VM), NR; purplish violet.

'Rossini' (Lud.), R; A-454, D-5A; U-2-3fld; 26″ h; fls. 7½″ diam; carmine rose (HCC-21) with neyron rose (623) seg tips, darker shade in throat; spr; dec. c. Ludwig & Co. 1954.

'Rostenli' (VM.), NR; white center with pink edge.

'Rosy Cloud' (VW. 1960), R; A-663, D-5A; U-4fld; 18″ h; fls. 8″ diam; pearl pink, darker ribs, center of segs flushed carmine, green and white throat. PL. 17:53. 1961.

'Rosy Dawn', R; A-782, D-5A; U-4fld; 18″ h; fls. 7″ diam; carmine rose (HCC-621), darker shade in throat; spr., dec. I.—Goed. for a Dutch breeder.

'Rotterdam' (W-WS. 1962), R; A692, D-5A; U-4fld; 20″ h; fls. 7″ to 8″ diam; currant red (HCC-821/2) to (821) in throat. PL. 19:65. 1963.

'Rouge' (Vas. 1936), R; A-321, D-5B; deep red. Hb. 3:92. 1936.

'Royal Dutch' (Lud. 1961), R; A-670, D-5A; U-4fld; 24″ h; fls. 7″-8″ diam; tips orient red (HCC-818/1) changing to light scarlet inwards to pure white and greenish in throat. PL. 18:41. 1962.

'Royal Garnet' (Whe. 1940), R; A-322, D-5A; fls. 7½″ diam; dark red, darker throat, satiny appearance, Hb. 7:130. 1940.

'Royal Ruby' (W-WS. 1959), R; A-552, D-5A; U-4fld; 28″ h; fls. 9″ diam; brilliant medium red. PL. 16:76. 1960.

'Royal Standard' (Veit.), R; A-323. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Royal Velvet' (VW. 1956), R; A-394; U-3-4fld; 24″ h; fls. 8″ diam; deep red to purple. PL. 14:54. 1958.

'R. P. Pitcher' (Will.), R; A-324; cl. 'Defiance' x **A. reticulata**; autm. Nehr. Amaryll. 1909. Hb. 1:50. 1934.

'Ruby', R; A-325. Chitt. 1933. I.—Schr. 1931. Hb. 1:51. 1934.

'Ruby' (Hay. 1935), NR. Hb. 2:92. 1935.

'Ruby' (Zeiner, 1946), R; A-326, D-5A; fls. 6½″ diam; dark ruby red. Hb. 13:110. 1946.

'Ruby Gem' (Ker), R; A-327, D-5; ruby red. Hb. 1:51. 1934.

'Ruby Glow' (HDL. 1962), R; A-730, D-5A; U-4fld; 19″ h; fls. 6″ diam; geranium lake (HCC-20) with ruby red throat. I.—Goed. 1962. PL. 19:67. 1963.

'Ruby Supreme', NR. Hb. 9:211. 1942.

'Ruth' (Pfis), R; A-328; cl. 'Dr. Masters' x **A. pardina.** Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Ruth' (Chandler), NR. SPN. 13. 1942.

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'Safari' (HDL. 1963), R; A-761, D-5B; U-3-4fld; 12″ h; fls. 6½″ diam; orient red (HCC-819), darker throat. I.—VZ. 1963.

'Salisbury' (Brn. 1943), R; A-329; fls. 8″ diam; red lines on light background. Hb. 10:94. 1943.

'Salmon Beauty' (Heat. 1935), NR; SPN. 13. 1942.

'Salmon Beauty' (VW. 1956), R; A-395; U-4fld; 20″ h; fls. 8″ diam; salmon pink. PL. 14:54. 1958.

'Salmonea' (VW), R; A-417; U-4fld; 24″ h; fls. 8″-9″ diam; delicate light pink. PL. 14:55. 1958.

'Salmonette' (W-WS), R; A-509; U-4-6fld; 24″ h; fls. 8″ diam; clear salmon, darker throat. PL. 15:45. 1959.

'Salmon Giant' (VW), R; A-416; 28″ h; fls. 8″-10″ diam; coppery salmon pink. PL. 14:55. 1958.

'Salmon Joy' (Lud. 1948), R; A-330; U-4fld; 22″ h; fls. 9″ diam; salmon scarlet blending to deep red. PL. 7:72, f. 13:73. 1951.

'Salmon Joy' (Lud.), R; A-445, D-5A; U-3-4fld; 30″ fls. 8½″ diam; mandarin red (HCC-17/1), darker red throat; spr; dec. PL. 14:55. 1958.

'Salmon Queen' (Hay. 1935), NR. Hb. 2:92, f. :91. 1935.

'Salmon Queen' (Camm.), NR. PL. 10:79. 1954.

'Salmon Streak' (Zeiner, 1945), R; A-331, D-4B; fls. 6″ diam; salmon with white stripe in center of each seg. Hb. 12:104. 1945.

'Salmon Supreme' (Zeiner, 1945), R; A-332, D-5B; fls. 6½″ diam; salmon colored. Hb. 12:104. 1945.

'Salome' (BM. 1962), NR; azalea pink, salmon pink, and shrimp red, cream bordered.

'Salvator Rosa', R; A-333. Chitt. 1933. I.—Paul, 1893. Hb. 1:51. 1934.

'Sappho' (Ker), R; A-334. D-5; carmine red. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Sarah Cole' (T & H, 1938), R; A-335; pink. Hb. 5:91. 1938.

'Sarong' (BM. 1954), R; A-617, D-5B; U-3fld; 26″ h; fls. 9″ diam; dutch vermilion (HCC-717). PL. 17:52. 1961.

'Scarlet Beauty' (W-WS), R; A-510; U-4fld; fls. 9″ diam; 24″ h; scarlet to medium red, darker throat. PL. 15:45. 1959.

'Scarlet Gem' (Ker), R; A-336, D-5; pure brilliant scarlet red. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Scarlet Globe' (VW. 1962), R; A-739, D-5A; U-3-4fld; 24″ h; fls. 6″-7½″ diam; scarlet red (HCC-19/1). PL. 19:67. 1963.

'Scarlet King' (Chandler), NR; SPN. 13. 1942.

'Scarlet Leader' (Lud. 1948), R; A-337; U-4fld; 22″ h; fls. 7″ diam; scarlet, suffused with red, darker throat. Hb. 15:69. 1948.

'Scarlet Leader' (VW), R; A-418; U-4fld; 28″ h; fls. 8″-10″ diam; scarlet red, darker red spot in throat. PL. 14:55. 1958.

'Scarlet O'Hara' (BM. 1958), R; A-618, D-5A; U-4fld; 24″ h; fls. 9″ diam; scarlet on white base and midribs. PL. 17:52. 1961.

'Scarlet Pimpernel' (VW), R; A-419; U-4fld; 26″ h; fls. 8″-9″ diam; pure scarlet self. PL. 14:55. 1958.

'Scarlet Queen' (Chandler), NR. SPN. 13. 1942.

'Scarlet Triumph' (W-WS), R; A-511; U-4fld; fls. 10″ diam; clear scarlet, nearly light red. PL. 15:45. 1959.

'Schubert' (BM. 1958), R; A-648, D-5B; U-3fld; 18″ h; fls. 9″ diam; azalea pink (HCC-618), vermilion, and white midribs. PL. 17:52. 1961.

'Scotty's White' (Dorr, 1962), R; A-699, D-5A; U-4fld; 18″ h; fls. 6″ diam; white with greenish tint. PL. 19:66. 1963.

'Sea Nymph', R; A-338. Chitt. 1933. I.—Paul, 1899. Hb. 1:51. 1934.

'Selma' (VM), NR; salmon.

'Seminola' (Hay. 1938), R; A-339; U-3fld; fls. 7″-8″ diam; dark red self. Hb. 5:146. 1938.

'Senator Wallace' (VW. 1958), R; A-420; U-4fld; 24″ h; fls. 8″ diam; rose, shaded white. PL. 14:55. 1958.

'Senorita', NR; **a. evansiae x A. striata**; pink changing to soft pink as the flower ages, chartreuse star in throat. c. Claude W. Davis. 1962.

'Sensation' (Cron. 1960), R; A-652, D-5A; U-4fld; 24″ h; fls. 10″-11″ diam; white, rose madder border. Mead strain pink x 'White Dazzler'. PL. 17:51. 1961.

Seraph', R; A-340; lilac red, white, white star and streaks. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Seraphis', R; A-341; lilac red, white stripes. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Serapis II' (Heat. 1934), NR. Hb. 2:90. 1935.

'Seymouri' (Herb.), NR; **A. aulica x A. vittata**. Hb. 1:51. 1934.

'Shakespeare' (Lud.), R; A-456, D-5A; U-4fld; 26″ h; fls. 8″ diam; dark orient red (HCC-819), dark red throat; spr; dec. c. Ludwig & Co. 1954.

'Shepherdess' (BM. 1957), R; A-619, D-5B; U-3fld; 16″ h; fls. 7″ diam; delft rose (HCC-o20), carmine rose influence. PL. 17:52. 1961.

'Show Boat' (BM. 1962), NR; orient red.

'Show Girl' (Lud.), NR; U-4fld; fls. 8″ diam; turkey red (HCC-721), dark blood red (HCC-820) in throat. c. Ludwig & Co. 1954.

'Siam' (BM. 1962), NR; azalea pink, soft white center.

'Sibyl Houdyshel' (Houd. 1934), R; A-342; white, narrow pink line on border, flushed and lined pink in throat; fr. Hb. 9:211. 1943.

'Sight Show' (Lud. 1961), R; A-671, D-5A; U-4fld; 26″ h; fls. 8″-9″

diam; porcelain rose to carmine rose, darker throat. PL. 18:41. 1962.

'Signal Hill' (BM. 1954), R; A-620, D-5B; U-3fld; 18″ h; fls. 7½″ diam; signal red (HCC-719), white central star. PL. 17:52. 1961.

'Silver Halo' (Ram. 1959), R; A-546, D-5A; 22″ h; fls. 6½″ diam; scarlet (HCC-19), white throat, ⅛″ silver edge on margins; spr; dec. PL. 16:76. 1960.

'Silver Lining' (Lud. 1956), R; A-458, D-5A; U-4-5fld; 28″ h; fls. 9″-10″ diam; red and white striped, segs white edged, spr; dec. PL. 14:55. 1958.

'Silver Queen', R; A-343. Chitt. 1933. I.—Paul, 1892. Hb. 1:51. 1934.

'Singapore' (BM), R; A-621; orient red. PL. 17:52. 1961.

'Sir Christopher Wren', R; A-344. Chitt. 1933. I.—Holf. 1902. Hb. 1:51. 1934.

'Siren' (Lud. 1953), R; A-459, D-5A; U-4fld; 27″ h; fls. 8″-9″ diam; salmon rose violet shaded, lighter in center of segs. PL. 14:55. 1958.

'Sir William', R; A-345. Chitt. 1933. I.—RBG, Kew, 1899. Hb. 1:51. 1934.

'Skilwag' (BM, 1956), R; A-622, D-5B; U-3-4fld; 15″ h; fls. 8½″ diam; deep vermilion (HCC-18). PL. 17:52. 1961.

'Smollet', R; A-346; scarlet red, darker in center. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Snowdon' (Fiel.), R; A-347, D-5; white. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Snow King' (Ker), R; A-348, D-5; pure white. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Snow Man' (VW. 1950), R; A-664, D-5; fls. 6″ diam; snow white with green throat; fr. PL. 17:53. 1961.

'Snow Queen' (Lud. 1948), R; A-349; U-4fld; 18″ h; fls. 7½″ diam; pure white; e. spr. c. Ludwig & Co. 1954. Hb. 15:69. 1948.

'Snowstorm' (VW. 1956), NR; U-2-3fld; 20″ h; fls. 7″ diam; pure white, green lustre and green throat. PL. 14:54. 1958.

'Socrates' R; A-350. Chitt. 1933. I.—Veit. 1898. Hb. 1:51. 1934.

'Solina' (VM), NR; salmon orange.

'Sonia' (Vas. 1940), R; A-351; red, white keels. Hb. 6:155. 1940.

'Sorita' (VM), NR; salmon.

'Southey', R; A-352. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Speciosa' (Ker), R; A-353, D-5; edges and tips white, middle deep red. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Spectabile', R; A-354; reginae hybrid. Bak. Amaryll. 1888. Hb. 1:51. 1934.

'Spectabilis' (Ker), R; A-355, D-5; red, tips, white. Hb. 1:51. 1934.

'Speculum', R; A-356. Chitt. 1933. I.—Veit. 1894. Hb. 1:51. 1934.

'Splendidum' (Herb. 1824), R; A-357; **A. vittata** x **A. reginae** Hb. 1:51. 1934.

'Spofforthiae' (Herb.), R; A-358; **A. aulica** x 'Carnarvoni'. Hb. 1:51. 1934.

'Spot' (Zeiner, 1945), R; A-359, D-5B; fls. 7″ diam; pure white, with a few pink spots. Hb. 12:104. 1945.

'Spotted Angelina' (Bon. 1909), R; A-360; **A. pardina** hybrid. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Spotted Orfeo' (Bon.), R; A-361. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Spring Butterfly' (BM. 1957), R; A-623, D-5B; U-3fld; 24″ h; fls. 7″ diam; white, flushed scarlet and picotee edge. PL. 17:52. 1961.

'Spring Dream' (Lud. 1959), R; A-542, D-5A; U-4fld; 25″ h; fls. 7″-8″ diam; delft rose (HCC-o20/1), rosy red glossy throat. PL. 16:76. 1960.

'Springsong' (Ram. 1959), R; A-547, D-5A; 22″ h; fls. 7½″ diam; oriental red (HCC-819), white star in throat; spr. PL. 16:76. 1960.

'Square Dance' (Lud. 1962), R; A-704, D-5A; U-4fld; 28″ h; fls. 9″-10″ diam; picotee novelty, red edge on each white seg, green throat. PL. 19:65. 1963.

'St. James' (VM), NR; deep red.

'Stained Glass' (BM. 1954), R; A-649, D-5A; U-2fld; 20″ h; fls. 8″ diam; porcelain rose (HCC-620), with white. PL. 17:52. 1961.

'Stansted' (Chal. 1935), NR; fls. 13″ diam; pure white. SPN. 13. 1942.

'Star Burst' (Muns. 1963), R; A-753, D-7; U-2-3fld; 20″ h; fls. 4″ diam; azalea pink (HCC-618) and begonia pink (619), pale green throat blending to white 1/3 of segs.

'Star of Bethlehem' (W-WS), R; A-512; 24″ h; fls. 3½″ diam; salmon pink, white towards margins forming a star. PL. 15:45. 1959.

'Star of India', R; A-362; dark red, broad white bands. Hb. 1:51. 1934.

'Stella' (Dug. 1957), R; A-403, D-7; 22″ h; fls. 7″ diam; geranium lake (HCC-20), darker in throat. PL. 14:54. 1958.

'Stratford' (BM. 1962), NR; light and dark azalea, changing to porcelain rose.

'Strawberry Glow' (Hay. 1935), NR; Hb. 2:92. 1935.

'Streaking Stripes' (Lud. 1962), R; A-705, D-5A; U-4fld; 28″ h; fls. 8″-9″ diam; pure white with mandarin red stripes, greenish throat. PL. 19:65. 1963.

'Striped Beauty' (W-WS), R; A-513; U-3-4fld; 20″ h; fls. 6″ diam; white, orange scarlet bands. PL. 15:45. 1959.

'Striped Superiora' (VM), NR; descr. lacking.

'Summer Rose' (Zeiner, 1944), R; A-363; fls. 8″ diam; rose with white stripe. Hb. 11:266. 1944.

'Sunburst' (HDL. 1963), R; A-769, D-5B; U-4fld; 10″ h; fls. 6½″ diam; white, carmine red stripes, less color in lower segs, greenish-white throat. I.—Goed. 1963.

'Sunrise' (Whe. 1940), R; A-364; light red, darker to throat. Hb. 7:130. 1940.

'Sunset' (Heat. 1934), NR; Hb. 2:90. 1935.

'Sunset' (Zeiner, 1945), R; A-365, D-4B; orange, white midrib. Hb. 12:104. 1945.

'Superba' (VM), NR; bordeaux red.

'Susan Hough' (Whe. 1940), R; A-366, D-4A; old rose, 4-I-2, lighter on outside and center of segs, darker in center of flower. Hb. 7:130. 1940.

'Susie Pink' (Gasp. 1958), R; A-398, D-5A; 28″ h; fls. 7½″ diam; rose madder (HCC-23), light greenish throat; fr.; spr. PL. 14:54. 1958.

'Swahili' (HDL. 1963), R; A-762, D-5A; U-4fld; 16″ h; fls. 7″ diam; dutch vermilion (HCC-717), slightly darker throat. I.—VZ. 1963.

'Sweetii' (Sweet), NR; **A. reticulata** x **A. johnsonii.** Herb. Amaryll. 1837. Hb. 1:51. 1934.

'Sweet Seventeen' (W-WS), R; A-514; U-4fld; 20″ h; fls. 9″ diam; salmon rose on white, flesh pink in throat. PL. 15:45. 1959.

'Sylvannus', R; A-367. Chitt. 1933. I.—Veit. 1902. Hb. 1:51. 1934.

'Sylvia' (Veit), R; A-368; **A. reticulata** x **A. leopoldii**; autm. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Symphony' (Lud. 1960), R; A-557, D-5A; U-4fld; 26″ h; fls. 8½″ diam; delft rose (HCC-o20), darker throat. PL. 17:53. 1961.

'Syren', R; A-369; clear rose. Nehr. Amaryll. 1909. I.—Veit. 1893. Hb. 1:51. 1934.

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'Tacola', R; A-370. Chitt. 1933. I.—Veit. 1898. Hb. 1:51. 1934.

'Talisman Cove' (Fitch), R; A-672, D-5A; U-4-5fld; 27″ h; 7″-8″ diam; rose madder (HCC-23/1) to rose bengal (HCC-25/1) in throat. PL. 18:42. 1962.

'Tangerine' (HDL. 1962), R; A-731, D-5A; U-4fld; fls. 6″ diam; bright and clear delft rose (HCC-o20). I.—Goed. 1962. PL. 19:67. 1963.

'Tartan' (Camm.), NR. PL. 10:79. 1954.

'Telemus', R; A-371; white, veined lilac red. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Television' (W-WS. 1962), R; A-691, D-5A; U-4-5fld; 20″ h; fls. 6½″ diam; french rose (HCC-520) blended with white, porcelain rose in upper segs. PL. 19:65. 1963.

'Telstar' (VW. 1962), R; A-740, D-5A; U-3-4fld; 12″ h; fls. 7″ diam; solferina purple (HCC-26). PL. 19:67. 1963.

'Terra Cotto' (HDL. 1962), R; A-732, D-5A; U-4fld; fls. 6″ diam; bright vermilion (HCC-18). I.—Goed. 1962. PL. 19:67. 1963.

'Tettaui', NR; form of **A. aulica robusta.** Hb. 1:51. 1934.

'Thaba Nchu' (BM. 1958), R; A-624, D-5B; U-3fld; 20″ h; fls. 8½″ diam; blood red (HCC-820). PL. 17:52. 1961.

'Thalia' (VM. 1962), R; A-746, D-5A; U-3-4fld; 12″ h; fls. 7½″ diam; azalea pink (HCC-618/1) on white base and border, greenish throat. PL. 19:67. 1963.

'The Bride', R; A-372. Chitt. 1933. I.—Holf. 1926. Hb. 1:51. 1934.

'The Champion', R; A-373. Chitt. 1933. I.—Veit. 1890. Hb. 1:51. 1934.

'The Czar', R; A-374. Chitt. 1933. I.—Holf. 1897. Hb. 1:51. 1934.

'The Fortress' (BM. 1958), R; A-625. D-5B; U-2fld; 14″ h; fls. 9″ diam; brick red (HCC-o16), short white midribs. PL. 17:52. 1961.

'The Hon. W. F. D. Smith', R; A-375. Chitt. 1933. I.—Hamb. 1893. Hb. 1:51. 1934.

'Theodore L. Mead' (Heat. 1934). Hb. 2:90. 1935.

'The Pirate' (BM. 1954), R; A-650, D-5B; U-4fld; 20″ h; fls. 8″ diam; blood red with white star and white flushing. PL. 17:52. 1961.

'The Queen' (W-WS), NR; cerise.

'The Rebel' (BM. 1955), R; A-626, D-5B; U-4fld; 26″ h; fls. 8″ diam; scarlet, flushed white. PL. 17:52. 1961.

'The Schooner' (BM. 1958), R; A-627, D-5B; U-2fld; 16″ h; fls. 9″ diam; azalea pink (HCC-618), flushed creamy white. PL. 17:52. 1961.

'The Vigil', R; A-376; white striped red. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Thornkill' (Whe. 1940), R; A-377, D.5A; medium dark red, darker throat. Hb. 7:131. 1940.

'Thriller' (Lud.), NR; orient red.

'Thunberg' R; A-378; Chitt. 1933; I.—Veit. 1897. Hb. 1:51. 1934.

'Time Signal' (BM. 1958), R; A-628, D-5B; U-3fld; 18″ h; fls. 8″ diam; signal red (HCC-719). PL. 17:52. 1961.

'Timmy' (Cal. 1958), R; A-404, D-5B; 26″ h; fls. 5½″ diam; cherry red (HCC-722) seg margins whitish, faint white mid-stripe; fr. PL. 14.55. 1958.

'Tippy' (Zeiner, 1946), R; A-379, D-4B; fls. 4½″ diam; white with salmon stripes. Hb. 13:110. 1946.

'Titan', R; A-380. Chitt. 1933. I.—Veit. 1900. Hb. 1:51. 1934.

'Topaz', R; A-381; orange red, border and striped white. Nehr. Amaryll. 1909. Hb. 1:51. 1934.

'Topscore' (W-C, 1962), R; A-727, D-5A; U-4fld; 15″ h; fls. 7½″ diam; signal red (HCC-719/1), glossy blood red throat; spr. PL. 19:67. 1963.

'Traffic Stop' (Lud. 1958), R; A-468, D-5A; U-4fld; 25″ h; fls. 8½″ diam; capsicum red (HCC-715), slightly darker throat; spr; dec. PL. 15:44. 1959.

'Triple Treat' (Zeiner, 1944), R; A-382; fls. 6″ diam; scarlet to rose, white midrib. Hb. 11:266. 1944.

'Tristan' (VM. 1955), R; A-532; 24″ h; fls. 8″ diam, dark purple red. PL. 15:47. 1959.

'Trixie' (Lud. 1962), R; A-706, D-5A; U-4fld; 24″ h; fls. 8″-9″ diam; cherry red (HCC-722/2) to tyrian rose (24/1/2), darker throat. PL. 19:65. 1963.

'Tropical Sunset' (Ram. 1959), R; A-548, D-5A; 26″ h; fls. 7″ diam; signal red (HCC-719), white throat and red spots; spr; dec. PL. 16:76. 1960.

'Tzaneen' (BM. 1958), R; A-629, D-5B; U-4fld; 16″ h; fls. 7½″ diam; mandarin red (HCC-17), white on midribs. PL. 17:52. 1961.

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'United Nations' (Lud. 1963), R; A-759, D-5B; U-4fld; 28″ h; fls. 9″ diam; vermilion stripes on pure white petals.

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'Vandyke', R; A-383. Chitt. 1933. I.—Veit. 1891. Hb. 1:51. 1934.

'Venus', NR. Hb. 1:63. 1934.

'Verona' (VM. 1961), R; A-752, D-5A; U-2fld; 12″ h; fls. 6½″ diam; carmine red (HCC-21/1), light green throat, white midribs halfway up segs.

'Vesta', NR. Hb. 1:63. 1934.

'Violetta' (W-WS), R; A-515; U-4fld; 22″ h; fls. 8″ diam; medium to dark rose, light rose throat and midribs. PL. 15:45. 1959.

'Virginia' (Heat. 1934), NR; Hb. 2:90. 1935.

'Virgin Queen', NR. Hb. 1:63. 1934.

'Viscountess Hambledon', R; A-384. Chitt. 1933. I.—Smith, 1896. Hb. 1:51. 1934.

'Vittata Harrisoniana', NR. Chitt. 1933. I.—Bull, 1894. Hb. 1:51. 1934.

'Volendam' (VM. 1956), R; A-533; 22″ h; fls. 7″ diam; white, edged rose pink. PL. 15:47. 1959.

'Voodoo' (Lud. 1960), R; A-561, D-8; U-4-6fld; 16″ h; fls. 3″-3½″ diam; scarlet, star shape white striped, light green throat. PL. 17:54. 1961.

'Vulcan', R; A-385. Chitt. 1933. I.—Holf. 1907. Hb. 1:51. 1934.

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'War' (Chandler), NR. SPN. 13. 1942.

'War' (Heat. 1934), NR; U-2-3fld; fls. 6″ diam; dark red, heavily veined. 1. hom: "Mephisto". Hb. 2:90. 1935.

'Watermelon' (Zeiner, 1945), NR; D-5A; fls. 9″ diam; rose-red self. Hb. 12:104. 1945.

'White Abundance' (VW), R; A-397; U-4fld; 26″ h; fls. 8″ diam; pure white, throat slightly greenish turning to pure white. PL. 15:46. 1959.

'White Beauty' (Heat. 1935), NR. SPN. 13. 1942.

'White Belle' (BM. 1954), R; A-630, D-5B; U-3-4fld; 16″ h; fls. 7½″ diam; creamy white, broken lines and pinpricks of currant red on upper segs. PL. 17:52. 1961.

'White Christmas' (VM. 1956), R; A-534; 24″ h; fls. 8″ diam; completely pure white. PL. 15:47. 1959.

'White Crane,' R; A-681, D-5B; U-4fld; 20″ h; fls. 7″-9″ diam; pure white, light green throat. I.—Goed. 1961. PL. 18:43. 1962.

'White Favorite' (Lud. 1960), R; A-558, D-5A; U-4fld; 26″ h; fls. 8″ diam; pure white, greenish throat. PL. 17:53. 1961.

'White Giant' (Lud.), R; A-460, D-5A; U-3-4fld; 24″ h; fls. 9″ diam; white, of heavy substance, greenish throat; spr; dec. c. Lud. & Co. 1954.

'White Orchid' (Brn. 1934), R; A-386; fls. 8½″ diam; pure white, whitish green throat. Hb. 10:94. 1943.

'White Star' (Zeiner), NR; rose white stripe. Hb. 11:256. 1944.

'Willem Coetzer' (BM. 1960), R; A-651, D-5B; U-2fld; 12″ h; fls. 9″ diam; chartreuse green flushed brick red. PL. 17:52. 1961.

'Will Rogers' (Traub, 1934), NR; Hb. 2:92. 1935.

'Wings of Snow' (Camm.), NR. PL. 10:79. 1954.

'Winks' (BM. 1957), R; A-631, D-5B; U-3fld; 14″ h; fls. 7½″ diam; begonia (HCC-619), vermilion and white. PL. 17:52. 1961.

'Winner' (Beck. 1960), R; A-667, D-5A; U-4fld; 20″ h; fls. 7″ diam; orient red (HCC-819), greenish mid-stripe. PL. 18:42. 1962.

'Winter Carnival' (Lud. 1962), R; A-707, D-5A; U-4fld; 27″ h; fls. 9″-10″ diam; pure white with slight greenish-yellow throat. PL. 19:65. 1963.

'Winter Joy' (Lud. 1956), R; A-461; U-4fld; 23″ h; fls. 8″-9″ diam; vermilion red with dark red throat. PL. 14:55. 1958.

'Wisley' (BM. 1958), R; A-632, D-5B; U-4fld; 16″ h; fls. 9″ diam; azalea pink with poppy red and white on midribs. PL. 17:52. 1961.

'W. N. Campbell' (Rice, 1943), R; A-387; red and white striped. Hb. 10:149. 1943.

'Wyndham Hayward' (Traub, 1934), NR. Hb. 2:92. 1935.

'Wyndham Hayward' (Lud. 1953), R; A-462, D-5A; U-4fld; 30″ h; fls. 9″ diam; dark oriental red (HCC-819) with dark blood red throat. PL. 14:55. 1958.

## —XYZ—

'Zanzibar' (HDL. 1963), R; A-763, D-5A; U-4-5fld; 18″ h; fls. 6″ diam; delft rose (HCC-o20), greenish-white midrib halfway up segs. I.—VZ. 1963.

'Zebediela' (BM. 1962), NR; bright signal red.

'Zenith' (VM. 1956), R; A-535; 24″ h; fls. 8″ diam; 3 upper segs rose on white, 3 lower segs white. PL. 15:47. 1959.

'Zephyr', R; A-388. Chitt. 1933. I.—Veit. 1900. Hb. 1:51. 1934.

'Zulu' (Rice, 1943), R; A-389, nearly black. Hb. 10:149. 1943.

'Zulu' (HDL. 1963), R; A-764, D-5B; U-4fld; 14″ h; fls. 7½″-8″ diam; mandarin red (HCC-17), darkens slightly in throat, heavily veined. I.—VZ. 1963.

# PLANT LIFE

## VOLUME 21

[Nos. 1-4, Jan., Apr., Jul. & Oct.]

## 1965

EDITED BY
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Box 150, La Jolla, California

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The cover design by Penrith B. Goff is based on *Amaryllis cybister* as grown at the Los Angeles State and County Arboretum, Arcadia, Calif.

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## CORRIGENDA

### THE GENERA OF AMARLLIDACEAE, BY HAMILTON P. TRAUB PUBL. 1963

See Plant Life 20: p. v. 1964 for earlier corrigenda.

Page 27, in lower part of page, between "INFRAFAMILY" and "PANCRATIOIDINAE" change "III" to "II".
Page 31, under "1.MILULA", 3rd line change "11" to "161".
Page 76, under "Subgenus 2. ELISENA", 1st line, change "19: 77. 1963" to "21:96. 1965."
under "Subgenus 3. PSEUDOSTENOMESSON", 2nd line, change "78. 1963" to "21:96. 1965."
under "Subgenus 4. ISMENE", 1st and 2nd lines, change "19: 88. 1963" to "21:96. 1965."
under "93. EURYCLES", 2nd line, change "Herb." to "Bak."

# CORRIGENDA

## LINEAGICS, BY HAMILTON P. TRAUB

Published Aug. 6, 1964

### CORRIGENDA

Page 18, second line, change "332" to "322".

Page 19, under 1865, first line, change "ingetitance" to "inheritance".

Page 22, under "1963—(d)", change "Maryr" to "Mayr".

Page 27, Table 1, at end of 2nd line, delete "the".
Table 1, II, change "cretaceous" to "cetaceous".

Page 33, 6th line from top, change "1662" to "1622".

Page 34, second to last paragraph, beginning with "Microorganisms, etc.", first line, change "1660" to "1680".

Page 37, in section heading "(B)", change "ANDANSONIAN" to "ADANSONIAN".

Page 50, Table 10, 4th line of caption, change "Thompson" to "Thomson".

Page 53, third paragraph, 9th line, after "acceptable" add "group".

Page 61, end of line 16 and beginning of line 17, from bottom, change "func/tion" to "functions".

Page 62, Figure 2, caption, third line, change "meterology" to meteorology".

Page 69, fifth paragraph, 6th line, change "(age)" to "(eage)".

Page 85, under "(a)" REALITY OF, AND TERMINOLOGY FOR, HIERARCHIC LINEAGES OR PHYLONS", change "above" to "based on".

Page 91, under "PARALLELISM", third paragraph, 3rd line, change "common" to "related".

Page 92, 5th line from bottom, change "*venleestenii* to "*vanleestenii*".

Page 96, third line from bottom, change "includs" to "includes".

Page 99, Table 15, align "5a" with "(b) impediolinon"; change second "5a" to "5b", and align it with "(c) desinolinon".

Page 102, second line from bottom, change "12" to "13".

Page 103, first paragraph, 11th line, change "inclusive" to "inconclusive".

Page 108, under section "(b)", 2nd line, after "often", insert "of".

Page 112, under "(C) FROM AUTOTROPHY TO SECONDARY HETEROTROPHY", second paragraph, after fifth line, insert missing line, "autotrophs, known as *obligate autotrophs,* obtain their nutrition".

Page 117, paragraph below Table 21, second line, change "*Spirochetebacae*" to "*Spirochetobacae*". In the following paragraph, 6th line, between "from" and "standpoint", insert "the".

Page 121, 5th line from bottom, between "with" and "state", insert "the".

Page 123, 6th line from top, after "pointed" insert "out", and in fourth paragraph, center, 6th line down, at end of line add "(b)".

Page 126, under ''THE HIERARCHIC TAXA'', end of first line, change ''were'' to ''was''. And line 11 from bottom, insert comma '','' between *''order''* and *''class''*.

Page 127, 2nd line from top, delete ''that''. And 21st line from top, change ''of'' to ''or''.

Page 129, under section ''D'', top, 3rd paragraph, 2nd line, change ''are'' to ''is''.

Page 132, last line of first paragraph, after ''Andrews et al'' insert ''Virol''.

Page 133, middle of page, the paragraph beginning with ''Physum 8. *Myxobacae''*, first line, change ''red-shaped'' to ''rod-shaped''.

Page 138, under SUBKINGDOM 3. *ANIMALIA*, 6th line, change ''subkingdoms'' to ''infrakingdoms''.

Page 142, under Phylum 5. *CHLOROBACAE*, Family 1. Chlorobiaceae, change ''(*Chloronium*)'' to ''(*Chlorobium*)''.

Under Phylum 6. *CHROMOBACAE*, Class 2, Order 1, Family 1, change ''(*Phodopseudomonas*)'' to ''(*Rhodopseudomonas*)''.

Page 150, under ''(b) CONVERSION FROM LINES, etc.'', 1st column, 2nd line from bottom, change ''30.45'' to ''30.48''.

Page 155, after entry, ''Just, T., etc.'', insert entry, ''Keith, The Theory of Human Evolution. 1949.''

Page 157, after entry, ''Rothmaler, W. etc.'', insert the entry, ''Royal Society, The, of London, Notes and Records, 14: No. 1. 1959.''

## ADDENDA TO "TRAUB, LINEAGICS" (1964)

### THE LINEAGICIST IS A SCIENTIST, NOT A KEEPER

Due to space limitations in Chapter 3, it was not possible to consider the matter suggested by the above title in ''Lineagics'' (Traub, 1964). It does appear now that this subject should not be put off until the publication of the complete text later, and this is a sufficient reason for this brief addenda note.

Unfortunately, the role of the lineagicist has been misunderstood all these hundreds of years, and in our time he has often been given the title ''curator'' (sometimes even ''keeper''). ''Curator'' signifies ''a person having the care of anything, an overseer, keeper, or custodian of a museum''. In the present case it refers to the housing and care of preserved specimens of organisms fossil and recent, and/or parts thereof. The care of such specimens can be entrusted to anyone with an adequate *technical* training, but the role of the lineagicist transcends such a technical role (see Traub, 1964). He should be a full-fledged scientist who works in the field of lineagics. He makes use of preserved specimens of organisms, and a wide variety of other tools, and his role should never be confused with that of a mere ''keeper''. Lineagicists therefore have the right to receive titles commensurate with the important scientific function that they perform. Such titles could consist of the following:

*Director,* of the section of lineagics, in the division of biology
*Chief Lineagicist,* or *Professor of Lineagics**
*Lineagicist,* or *Associate Professor of Lineagics**
*Assistant Lineagicist,* or *Instructor in Lineagics**

---

* When research and teaching functions are combined.

The title of ''curator'' should be reserved for those who have adequate technical training in (a) the making of slide preparations of, and the culturing of, procaryotes, microscopic plants, hetertroplants (fungi) and animals; and (b) preserving microscopic plants, heteroplant (fungi) and animal specimens, and (c) the care of such preparations and specimens. Such workers, who have not received a comprehensive scientific training could make a career in this field, or they may work on a temporary basis while pursuing graduate work to prepare themselves to join the ranks of the lineagicists. Appropriate titles in this field could include:

*Chief Curator,* in the section of lineagics, in the division of biology
*Curator*
*Associate Curator*
*Assistant Curator*

## LITERATURE CITED

Traub, Hamilton P. Lineagics. 1964.

## ALTERNATE FOR "PRIMARY HETEROTROPH" HYPOTHESIS

In Traub (Lineagics. 1964), Chapter 4, under ''(a) Hypotheses on the Coming into Being of Organisms'' (pages 72-73), the alternate hypothesis of Needham (''The Origination of Life'', in Quart. Rev. Biol. 34: 189-209. 1959), should be considered.

Needham (1959) has recently subjected the 'primary heterotroph' hypothesis, which he characterizes as an 'ametabolic view', to criticism. He proceeds on the assumption that the origination of life was ''a spontaneous, natural sequence of 'most probable' events. Survival by natural selection is a particular example of a most probable event, and therefore operated at all stages of the origination. True evolutionary novelties have been most probable responses to new environmental conditions, and may have become rarer as the rate of change of the causal conditions decreased.'' He explains that ''it is more probable that all significant materials and actions were acquired early, panglobally and in quantity, and that subsequent evolution was restricted (a) to most probable innovations . . . . and (b) to less fundamental changes, depending in part on changes in the biological environment itself. In general there has been biological simplification during evolution, rather than the converse.'' According to Needham (1959), an 'ametabolic' view such as that proposed by Oparin and others ''leads to the questionable conclusions that there were originally no autotrophs, no photoactivated endergonic syntheses, no need for solar energy, and no decay, that the initial heterotrophs could feed indefinitely on a limited store of pristine compounds, and that generally reducing conditions prevailed on the early earth. This view fails to recognize that the general level of oxidation is less important than the maintenance of a potential difference in free energy between organism and environment. It also tends to overlook the relative rapidity of the circulation of organic materials through living systems, and the evolutionary implications of this.''

It should also be added that apparently there is no evidence for evolution from heterotrophy to autotrophy and this is in harmony with the principle of irreversibility. Once a heterotroph always a heterotroph.

## LITERATURE CITED

Oparin, A. I. The Origin of Life. Dover, N. Y. 1953. See also Oparin, A. I. The Chemical Origin of Life. Academic Press. N. Y. 1964.

Needham, A. E. The Origination of Life, in Quart. Rev. Biol. 34: 189-209. 1959.

Traub, Hamilton P. Lineagics. 1964.

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PLANT LIFE LIBRARY—continued from page 162.

ONIONS AND THEIR ALLIES, by H. A. Jones and L. K. Mann. Leonard Hill (Publ.), London; Interscience Publ., New York; and John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016. 1963. Pp. 286. Illus. $12.50. This is the latest item in the important World Crops Books series. It is authored by two outstanding authorities in the field covered. The book is adequately illustrated, and will be welcomed not only by scientists and research workers but also by others concerned with the production of onions and allied crops. The topics covered include world onion production; history; grouping and identification; morphology and development; food value and chemical composition; genetics and cytology; breeding; adaptation of cultivars; growing and handling onion sets, transplants and seedlings; harvesting and handling; weed, disease and pest control; onion products; garlic and other onion allies. Highly recommended.

BOTANY—AN INTRODUCTION TO PLANT SCIENCE, 3rd Edition, by W. W. Robbins, T. E. Weier and C. R. Stocking. John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016. 1964. Pp. 614. Illus. $8.95. This third edition of an outstanding first course in botany will be welcomed. Without decreasing the emphasis on the plant as a whole, and its relation to its environment, the authors have added the new dimension of subcellular form and function made possible by recent developments in biology. This clearly written, adequately illustrated text is highly recommended.

ADVANCES IN ENZYMOLOGY AND RELATED SUBJECTS OF BIOCHEMISTRY, Vol. 26, edited by F. F. Nord. Interscience Publ., a division of John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016, 1964. Pp. 453. Illus. $12.50. This volume includes contributions by fourteen outstanding authorities. The topics covered include phytochrome and its control of growth and development; sugar nucleotides and the synthesis of carbohydrates; formation of secondary and tertiary structure enzymes; Die Wasserstoffuebertragung mit Pyridinnucleotiden; bagshaped macromolecules; Fortschritte auf dem Vitamin B-12—Gebiet; and the metabolism of propionic acid. Highly recommended.

EXPERIMENTAL BIOLOGY, by R. W. Van Norman, Prentice-Hall, Englewood Cliffs, N. J. 1963. Pp. 243. Illus. This is an introduction to methods, techniques and instruments used in experimental research in biology, and is particularly useful to the beginning student. The introductory chapters are concerned with science and research in general, and biological science in particular. The main body of the text is devoted to the methods, techniques and instruments commonly used in experimental biology. The concluding chapters are concerned with the design of experiments, the handling of experimental data; and the preparation of manuscripts. Highly recommended.

THE NATURAL GEOGRAPHY OF PLANTS, by H. A. Gleason and A. Cronquist. Columbia University Press, 2960 Broadway, New York, N. Y. 10027. 1964. Pp. 420. Illus. $10.00. This outstanding clearly written and easily readable text on plant geography will be welcomed by the specialist and the amateur. The first half is devoted to the factors involved in plant distribution, such as plant migration and "community life"; and the conditions on which they depend. The second half is concerned with the ten floristic provinces of the United States, and Canada, on the basis of common species and plant communities. The illustrations are outstanding and are worth the price of the entire book. Highly recommended.

FLORA EUROPAEA. Vol. 1. *Lycopodiaceae* to *Platanaceae,* edited by T. G. Tutin, V. H. Heywood, D. H. Valentine, S. N. Walters, and D. A. Webb. Cambridge University Press, 32 East 57th St., New York, N. Y. 10022. 1964. xxxiv + 464 pp. Illus. (maps). $16.00. This is an outstanding book, the first of a planned four volumes. The present project of an European Flora was first discussed by European lineagicists in 1954; this was followed in 1956 by a steering committee of nine. This committee in 1958 published a brief guide for contributors, and appointed an editor for each family with the objective of producing a concise and complete Flora in the shortest possible time. The editors, and all who contributed to the book, are to be congratulated on producing the first volume by 1964. The English Language was chosen because more lineagicists can communicate adequately in that language than any of the others. The families are arranged according to Engler and Diels as of 1936, but the Monocots follow the Dicots. The magnitude of the project can be judged from the fact that more than 40 committee members, advisors and consultants, and 51 contributors, have cooperated in producing this first volume.

After the introduction, there is a synopsis of the 79 families (to *Platanaceae*) included; keys to the major taxa of the families included in Volume One, and also to those which are to appear in the three volumes to follow; and explanatory notes on the text. Then follows the main text with descriptions of the families, genera, species, and subspecies. The appendices include keys to the abbreviations of authors, books and periodicals referred to in Volume One; a glossary of technical terms; vocabularium anglo-latinum; the index to families, genera, species and subspecies; and maps showing subdivisions of Europe.

This wonderful book cannot be praised too highly, and will be welcomed by all interested in plants. It is a handsome, easily readable volume which is highly recommended.

PLANT LIFE LIBRARY—continued on page 4.

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# PLANT LIFE

## AMARYLLIS
## YEAR BOOK

1965

*Amaryllis cybister*

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PLANT LIFE, VOL. 21, NO. 1, January, 1965

# AMARYLLIS
# YEAR BOOK
# 1965

Year Book of
The American Amaryllis Society
32nd Issue

GENERAL AMARYLLID EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California

# THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

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# PREFACE

Again Prof. Goff has provided an outstanding 1965 cover design featuring *Amaryllis Calyptrata* as grown at the Los Angeles State and County Arboretum at Arcadia, Calif. This shows the extreme in the direction of the orchid-flowering *Amaryllis.* Next year the other extreme will be pictured on the cover, the regular-flowered *Amaryllis leopoldii* which has been rediscovered by Dr. Cardenas of Cochabamba, Bolivia.

This issue is dedicated to Robert Daly Goedert of Jacksonville, Florida, who received the 1965 William Herbert Medal in recognition of his outstanding contributions toward the advancement of *Amaryllis* culture. He is a commercial dealer in *Amaryllis,* and other amaryllids, of the highest stature. He stands for the highest quality in registered named *Amaryllis* clones, encourages the breeding of new kinds of hybrids by the introduction of new species even when these represent a financial loss to him. He has introduced two large quantity lots of seeds of the Blue Amaryllis, *Worsleya rayneri,* from Brasil, and a large number of lots of *Amaryllis* species collected for him in the wilds in South America. Some of these are bound to be of the same species, but species are often variable. It is worth while to have different lots of the same species in order to locate worth while varieties. The congratulations of all of the members go with the award of the HERBERT MEDAL to Mr. Goedert, who presents a charming autobiography in the present issue.

The 1965 AMARYLLIS YEAR BOOK represents a rich harvest. The rediscovery of *Amaryllis leopoldii,* already indicated, will make it memorable in the annals of amaryllid history. In addition Dr. Cardenas describes three other new *Amaryllis* species. Mr. Goedert contributes an extensive summary of the 1965 *Amaryllis* season. Mr. Buck writes about *Amaryllis cybister.* Mr. Boshoff-Mostert describes vegetative propagation of *Amaryllis* for the amateur, and the professional grower. Mr. Frank A. Turner, a 7th grader, describes his science project concerned with *Amaryllis* propagation. Mrs. McCown reports on hybrid *Amaryllis* for desert regions. Mr. Caldwell writes about the control of *Amaryllis* pests, and Mr. Campbell on leaf disease control. The 1964 regional *Amaryllis* Shows are briefly reviewed.

The other amaryllids are not neglected. Mr. Hannibal writes about the crinums and other amaryllids of Australia and the Pacific Islands; and Dr. Zorbach reports on outdoor *Crinum* culture in Maryland. Mr. Hoerl contributes notes on *Haemanthus katherinae.* Mrs. Herold and Mr. Cloudette report on seedling development in the Blue Amaryllis. Dr. Rueppel in Argentina writes about amaryllid culture in his country. Mr. Caldwell contributes further notes on *Lycoris* breeding. Drs. Smith & Flory present a paper on the chromosomes of *Tulbaghia;* and Prof. Wilsenach reports on the chromosomes of five South African amaryllids. Dr. Howard contributes articles on the Blue Western Star, *Androstephium caeruleum,* and the genus *Nothoscordum.* Mr. Buck writes about *Hymenocallis fragrans,* and Daylilies in 1964. Dr. Howard reviews his collecting trip into Mexico and Guatemala. There are still other articles as shown in the table of contents.

*Hamilton P. Traub*
*Harold N. Moldenke*

*November, 28. 1964,*
*La Jolla, California*

PLANT LIFE LIBRARY—continued from page [x].

GENERIC NAMES OF ORCHIDS, by R. E. Schultes and A. S. Pease. Academic Press, 111 5th Av., New York, N. Y. 10003. 1963. Pp. 331. Illus. $12.00. This new book by two outstanding authorities on the origin and meaning of generic names of orchids will be welcomed by all who are interested in these plants. In the introduction the grouping of the orchids is considered on the historical basis; the importance of a stable nomenclature is emphasized, and the morphology and economic importance is discussed. The main part of the book consists of an adequately illustrated dictionary which explains the etymological history of the 1250 generic names of the *Orchidaceae;* the geographical distribution and tribal or subtribal grouping of the genera; and the place of first publication of the names. The scientific names of orchid generic hybrids are listed in the appendix. This book is indispensable to all who are interested in orchids. Highly recommended.

THE CHEMICAL ORIGIN OF LIFE, by A. I. Oparin. Trans. by Ann Synge. Chas. C. Thomas, Publ., 301-327 E. Lawrence Av., Springfield, Ill. 1964. Pp. 124. Illus. $6.75. Dr. Oparin is the pioneer in the field covered by this book, having published on this subject as early as 1924. His earlier text has gone through a number of revised editions. Now, 40 years later, he presents his ideas clearly and concisely in the light of recent developments in this field. He discusses three stages in the evolution of organic substances which preceded the appearance of life on earth—the initial stages in the evolution of carbon compounds; the formation of "primaeval broth"; and the origin of the earliest organisms. He then considers further evolution of the earliest organisms. This is required reading for all interested in biology. Highly recommended.

THE LIFE OF PLANTS, by E. J. H. Corner. World Publ. Co., 2231 W. 110th St., Cleveland 2, Ohio. 1964. Pp. 315. Illus. $12.50. This gifted author is to be congratulated in presenting a refreshing new book on the bioevolutionary course for plants and fungi. He traces their development from free cells in the ocean; to the attached vegetation of the sea; to a partial migration to the shore; and finally to the forest, grassland and desert vegetation. Such a charming and unconventional book could not be used as a main text in phytology and mycology, but *should be designated as required reading* for students to supplement the text for the regular biology course. Highly recommended to all others who are interested in plants and fungi.

PLANTS IN PERSPECTIVE; A LABORATORY MANUAL OF MODERN BIOLOGY, by E. H. Newcomb, G. C. Gerloff, and W. F. Whittingham. W. H. Freeman & Co., 660 Market St., San Francisco 4, Calif. 1964. Pp. 218. Illus. $3.75. The objective of the authors in this introductory course in phytology is to utilize recent advances in biology in order to obtain a more unified treatment of the subject, including the basic properties and principles relating to plant life, and with emphasis on experimentation. The topics covered are adaptability of life; some basic laboratory tools; properties of living substance; reproduction and inheritance of variation; growth, differentiation and morphogenesis; factors in growth and development; and bioevolution. Highly recommended.

PLANT LIFE LIBRARY—continued on page 38.

Dedicated to
Robert Daly Goedert

Herbert Medalist—Robert Daly Goedert

# ROBERT DALY GOEDERT

## AN AUTOBIOGRAPHY

I can't remember when I was not interested in flowers. Of course there must have been some short period in my early life before they began to fascinate me. I do remember as a small boy gathering wild flowers that grew in abundance in the woods near my home. My favorite wild flowers were the violet and sweet bay (swamp magnolia). I also remember picking great armfuls of native *Zephyranthes atamasco* which we as children called "Easter Lilies."

The first seed I remember planting was a packet of pansies. This was when I was about 9 years old. I believe every seed came up and eventually I set out some hundred or so plants. They were a blotched variety and I thought they were about the most beautiful things in the world. I was very proud of them and have loved pansies ever since. After this first experience my interest in flowers has never waned.

My father loved flowers and as long as I was at home he purchased seeds and bulbs each year which I planted or helped to plant. Of course as I remember it, I did the work. The arrangement was one from which, I am sure, I got the greater enjoyment. I felt that each flower that bloomed was something I had created. I know my father encouraged me and is partly responsible for the fact that my interest in flowers has always been very strong.

I think my interest in flowers through the years had run a complete cycle until some eight years ago when I made *Amaryllis* my main interest. *Amaryllis* had always interested me. My father had a bed of the Mead strain hybrids he had collected by purchasing a few each spring when they were in flower. After the old home place was sold, some years back, I obtained permission to pollinate the *Amaryllis* that had been left. From these I raised several hundred very nice hybrids and flowered them for a number of years. Each year my interest in *Amaryllis* grew and I wanted to improve the collection. Finding few sources in the United States where the finer clones could be purchased, I started importing a few each year from Holland; first for myself and then for friends. Finally about 8 years ago I decided to try advertising and selling to others. While this experience has been interesting it has not been profitable for the problems of the *Amaryllis* bulb dealer are many and very trying.

I have accumulated a sizeable collection of *Amaryllis;* hybrids and species, and in future years hope to spend more time hybridizing new types.

On December 10, 1912, I was born in Nashville, Tennessee, where my father was working as a salesman for the East Tennessee Meat Packing Company. He had met my mother in Blue Ridge, Georgia where she was working as a bookkeeper, I was to return there some 20 years later to meet my wife. My father was born in Iowa and had come south

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as a young man. My mother was born near Murphy, North Carolina in a small farming community called Peachtree.

I was the second son of six children, four boys and two girls. My older brother to whom I was very attached was drowned on a fishing trip when he was seventeen and I, only fifteen.

The first years of my life were spent between Nashville and Murphy, North Carolina, where my mother spent several months with her family each year. We moved from there to Jacksonville, Florida where my father had obtained a job. My father eventually became a partner in one of the largest meat packing plants in Florida and finally owner.

My home has been made in Jacksonville, Florida, except for brief periods, ever since. Once during the First World War we moved to Houston, Texas; then to Green Bay, Wisconsin, and then to St. Paul, Minnesota; finally returning to Jacksonville, all within a period of a few years.

I attended elementary and high school in Jacksonville going on to the University of Florida to study Chemical Engineering. During my youth I suffered greatly from headaches. They were particularly bad during my college days. This, together with the disappointments of the depression years in the 1930's when many college graduates were having to take common labor jobs, was possibly responsible for the fact that I dropped out of school after a year and a half. I worked for my father in the meat packing business for a short while. Then, wanting to get out on my own and prove my self, (always a strong urge within me) I went to North Carolina where my mother's people lived. An uncle got me a job as a brush cutter in a survey party doing land surveys for the United States Forest Service.

My love for the mountains and the beautiful flowers that grow in them made this a very pleasant time in my life. However, there was a vacancy in the office for a computer. Since mathematics is a very easy subject for me, I was able to obtain the job in the office at Blue Ridge, Georgia, where I did geodetic calculations and drafting.

That fall when school started, as in all small towns, several young out of town teachers came for the school year. I started dating one of the teachers, Miss Cathryn Highnote of Richland, Georgia. We were married in the spring of the next year.

I was soon transferred to the main office of the Chattahoochee National Forest in Gainesville, Georgia. That year, 1936, our first son was born. After about a year, the land purchasing program of the Forest Service was reduced and my work was terminated. I returned to Jacksonville, to work several months for my father.

In November 1937, I took a job with the Bureau of Public Roads doing Engineering work on the Natchez Trace Parkway. First I worked in the office in Jackson, Mississippi; then as inspector at Ridgeland and Kosciusko, Mississippi. Having a fondness for the outdoor life and particularly the mountains, which I dearly love, I returned to North Georgia when the Forest Service notified me they had an opening. When I was a small boy, my mother and we children spent several weeks each summer at her family's farm in the mountains of North Carolina. I spent many hours wandering over the mountains picking flowers and berries. I fell in love with the mountains at an early age so it was a natural thing for me to return at the first chance.

However my return was to be for a very short time. The Second World War was brewing and many civilian departments of the U. S. Government were being curtailed. Funds ran out for the job I held so the Forest Service asked me to transfer to Raleigh, North Carolina. I found out that they were to lay off another man in order to make a place for me and therefore I declined the job and returned to Jacksonville where I again worked with my father doing plant maintenance and construction work. When the war did actually start, possibly wanting to do more for the war effort and attracted by the high salaries in the engineering field, I took a job with a company doing engineering work for the Army Engineers at Bases on the west coast of Florida. During 1942-43 I worked on the construction of a number of facilities from Panama City to Naples, Florida.

By this time we had three children, two daughters and one son. Being away from home over long periods of time proved very difficult so I quit my job and started looking for work where I could be with my family. In December of 1943, I went to work for the Engineering Division of the Public Works Department of the United States Naval Air Station, Jacksonville, Florida. At first I was a draftsman, then chief Civil Engineer and finally Director of the Engineering Division, a position I still hold.

When I returned to Jacksonville late in 1943 my father let me use some vacant lots he had to carry on my hobby and I settled down to pursue it with great determination. First I grew a lot of vegetables as well as numerous kinds of flowers. Each year I expanded my planting and each year I gave away great numbers of flowers. Eventually I started selling to the local florists.

My general interest in flowers began to turn to more specific interest. My father had always loved dahlias and during my childhood had almost every year planted several new clones. They are showy and very impressive and my interest in them grew. The vegetables I had grown gradually disappeared and many of the annuals. My dahlia collection grew until I had several hundred hybrid clones. I saved seeds each year and raised hundreds of seedlings, always saving a few of the best rootstocks. I maintained this large collection for several years and had some outstanding seedlings in rare colors. I kept my dahlia collection stored in bushel baskets in my garage in winter. One year early in the spring we had a sudden freeze and I lost practically my entire collection. My interest in them did continue for several years and I did have one fine clone introduced. This one is a small yellow miniature named 'Tropicana' which is still one of the better miniature yellows today.

Being discouraged after losing my dahlia collection my interest gradually turned to gladiolus. Beginning with a dozen or so of a few kinds my collection gradually grew until I had practically every named clone then in commerce. I bought some acreage and seriously set about growing flowers for the local cut flower trade. After several years I had two acres under cultivation. About this time the Korean War started. The military had a rapid build up. I had to abandon my gladiolus in favor of my job and let several thousand dollars worth of bulbs grow up in weeds. During this time I worked 12 to 16 hours a day practically 7 days a week doing engineering for the Navy. I helped plan the Aircraft Carrier Base at Mayport and many airfields and other facilities in the north Florida area.

When the Korean War was over and things again returned to normal about all I had left in my flower garden were the *Amaryllis* I had planted from seed several years before. These flowered each year and I had selected some of the best to keep and disposed of the others. That winter I bought about $500 worth of the Dutch bulbs from Johnson Bros., in New Jersey. These impressed me very much so I crossed them with the Mead strain I had selected. When the crosses flowered they were very beautiful and my interest was spurred on. During this period I had started corresponding with many people seeking information regarding new and different clones and types of *Amaryllis.* Being one who always pursues a hobby in earnest I became seriously interested in this flower and I purchased bulbs from Holland, then India and other areas. At this time there were few United States companies that offered *Amaryllis* and those who did asked much higher prices than the Dutch firms. Partly as a public service since I had had such a hard time finding a source of named *Amaryllis,* and partly to work up something that I might turn into a livelihood when I retired, I decided to import and sell bulbs at the same price the Dutch companies offered them.

The first year I purchased possibly $1000 worth and sold them with little effort but as I remember it cost me between $500 and $1000 to sell them. The next year I increased the number I bought, and again sold them at what it cost me to buy them. Each year I have expanded my listing and usually at the end of the season I am poorer, more tired and possibly a little wiser. An *Amaryllis* bulb dealer's plight is one of frustration and hard work with little or no return for his effort except meeting and making some wonderful friends all over the world. Only the determination that I shall find a profitable method of marketing *Amaryllis* encourages me to continue. I have not found the solution but I do feel I have learned many things. I also feel *Amaryllis* have commercial possibilities and that they will become more popular in the future.

I have accumulated a very wonderful collection of *Amaryllis* hybrids and species. At present in the spring I am still busy with correspondence and orders and have little time to segregate my collection into types. I hope to arrange my work in the future so that I can give more attention to this and hybridizing.

I hope the effort I have made will be profitable to me in the satisfaction that I had some part in popularizing a wonderful plant, *Amaryllis.* I believe I have helped to make available better types and through my advertising have introduced these bulbs to a number of flower lovers who had never seen these improved types.

I also hope that through my efforts in finding collectors in South America, I will have introduced new species and helped in verifying habitat information and in finding the extent and distribution of different species in the wild.

I am sure that at times my methods have been criticized. First to the scientific mind I may appear a little unorthodox. One might say I have introduced and sold species without proper identification and some of these species may be duplicates. To this I must answer that I believe I have obtained as many *Amaryllis* species from different habitats as almost anyone in the past few years. My customers often paid a considerable price for these; some bought as named species have turned out to be something else. I can assure you, in most cases, I have subsidized the cost of the species. I often have paid the collectors several times what I received for the bulbs. The important point is that these species have been introduced into the United States and almost all in sufficient quantities that they will play a part in future hybridizing. In addition, it should be explained that there is *variation within the species,* and collections from different localities will bring these to the *Amaryllis* breeder.

Last season, after listing *Worsleya rayneri* seed for several years, I had $50.00 in orders. I had been promised seed of this for several years. Each year my collector would promise to try to get the seed but each year he had failed to get anyone to collect them. Last season I told him to get the seed at my expense. This he did. It cost me several times the amount I got for the seed. This is the story of the *Amaryllis* dealer who desires to sell species from the wilds. I am very proud that I have been able to obtain between 25 and 50 different shipments of amaryllis species from South America. All have been numbered and I am sure they will all eventually be identified properly. I do obtain habitat data now on most shipments. At first it was a struggle just to get a collector interested but dollars overcame some of this problem. To obtain any large number of a single species one has to turn from the professional to the commercial collector. To instill in the commercial trader the fact that you want the truth about his collecting and habitat data one often has to accept bulbs at an exorbitant price. There is no bargaining for price in collecting species and one has to be a little at the mercy of the collector as far as expense is concerned if reliable information is expected.

I have tried in my dealings with the growers to establish the highest standards in grading to insure quality and that clones are labeled true to name. Improvement still needs to be made; however. I feel the American Amaryllis Society can be proud of the progress its officers have made in this area in the past few years, especially in getting new introductions registered. We must be tolerant and patient in our efforts to get all *Amaryllis* clones named and registered for one must realize that the Dutch Growers control the market on these and only through their cooperation and honest desire to have the clones named will this be accomplished.

I predict that *Amaryllis* will increase in popularity in the future. But for this one must *not* only look to the collector and show enthusiast. We must develop new types for border planting, freer flowering types for the nursery and florist trade and above all satisfactory types for Mrs. Housewife who wants to flower a pot or so of these showy flowers each winter. Until we can cultivate her interest we will not have accomplished our goal. We must have small *Amaryllis,* dainty ones, many colors, and many forms to obtain the attention of Mrs. Housewife for she is the most important person in our lives today as well as being the one who spends most of the Nation's wealth.

# CRINUMS AND OTHER AMARYLLIDS IN AUSTRALIA AND PACIFIC ISLES

L. S. Hannibal

A visit to the Plant Quarantine Station in San Francisco during 1943 when World War Two was at its peak was quite an experience as innumerable Crinums were awaiting clearances there to be sent on to friends or relatives of American Troops then in the Pacific Theater. Thus, when the writer took a three months trip down through Hawaii, Samoa, Fiji, New Zealand and Australia he had a fair inkling of the bulbs to be found along the way, but despite his anticipations there were several interesting surprises and discoveries.

The first turned up in Honolulu where we saw great quantities of what is locally accepted as *Crinum asiaticum,* but we soon noted that the scapes of all these plants were 40 or 50 inches in length and that numerous small offsets were tightly grouped about the rather commonly exposed aerial pseudo-stems. In our experiences *Crinum asiaticum* normally increases rather slowly by the parent bulb splitting into twin daughter bulbs, and scapes are seldom more than 36 inches or more in length. In contrast a number of these Hawaiian crinums were bearing flowers having beautiful wine purple shadings, and a portion of these latter had foliage showing various degrees of copper-red tones. A more than casual inquiry at the Bishop Museum disclosed that the crinums with the colored blossoms were known as ''Queen Emma'' *Crinum* or *Crinum amabile* from Sumatra, and that the white flowered plants were *C. asiaticum.* The latter part of this statement was accepted with cautious reservations as it was quite obvious that the entire Hawaiian *Crinum* population was identical in all morphological characters, except for the floral and foliage pigmentation factors, and normally color by itself does not justify a species separation. The possibility that a *Crinum amabile—asiaticum* hybrid population had developed in the early days and was the cause of this color behavior was duly considered, and may possibly be the explanation, but the bulk of the features of all of the crinums are specifically those of *C. amabile*, including the white-flowered forms. And as we learned later similar white and pigmented bulbs are scattered throughout most of the islands of the Central and South Pacific. The Sydney and Adelaide botanical gardens had representative examples including the copper red foliage variant and these were marked as of Sumatra origin. The unfortunate feature is that we do not know if *C. amabile* shows these color variations in its native habitat, nor do we know the degree of variation within the species. However, evidence seems to point to a variable species.

In Florida *C. amabile* rarely sets seeds, but in Hawaii it sets great quantities. In the vicinity of Kaaawa (Pronounced Ka-a-a-wa) the plant is used as a roadside hedge along the highway, and innumerable escapes were seen in the fields. Rainfall in this particular area is about 150 inches yearly and temperatures range from 65 to 70°F. In most gardens it is rather apparent that the white-flowered or copper foliage forms have been selected for floral or foliage quality since many seedlings with inferior blossoms or color can be noted where the plants have run wild. It was noted that there was some pigmentation evident even in the white-flowered forms as some seed pods took on a purple hue while others did not, and it was also found that normally less than 10% of the copper red foliage forms reproduced true to color type when selfed. Many seedlings are of inferior color. All of the variations observed had foliage some five or six feet in height and normally the older bulbs had worked themselves out of the soil to such an extent that the long basal root stumps were supported on or above the soil by the massive root systems. Offsets at the base of the basal root stumps have to be removed periodically to prevent the parental bulbs from becoming a tangled mass of bulbs and foliage. A good example of both the pigment free, white-flowered bulbs and copper red foliage type are to be found in the Foster Gardens in Honolulu, or in the gardens at the Royal Hawaiian Hotel. Fig. 2 shows a typical bulb which has the offsets removed every six months.

*Hymenocallis littoralis* is also commonly found through Hawaii and the Pacific Isles. It too has become an escape in the vicinity of Haleiwa at the north end of Ohau. *Eucharis grandiflora* was noted in a few gardens and obviously quite a number of older *Amaryllis* species and trade type hybrids are scattered about. *Agapanthus africanus* was observed in some of the drier parts of the islands.

The stop at American Samoa was all too brief to do more than note some *C. amabile* growing near the shore in the vicinity of the airport. Fiji was far more profitable as two local *Crinum* forms had recently been planted in the gardens of the Mocombo Hotel at Nandi and one had a golden cast to the foliage. The color was accepted at first to be due to a phosphate deficiency, but we later learned that a golden foliage form of *C. pedunculatum* is known in the area, so the writer now regrets not having collected some seed. This bulb would be a welcome addition to frost free tropical gardens. The second form was quite similar to the first only that the foliage was a normal grass green. The

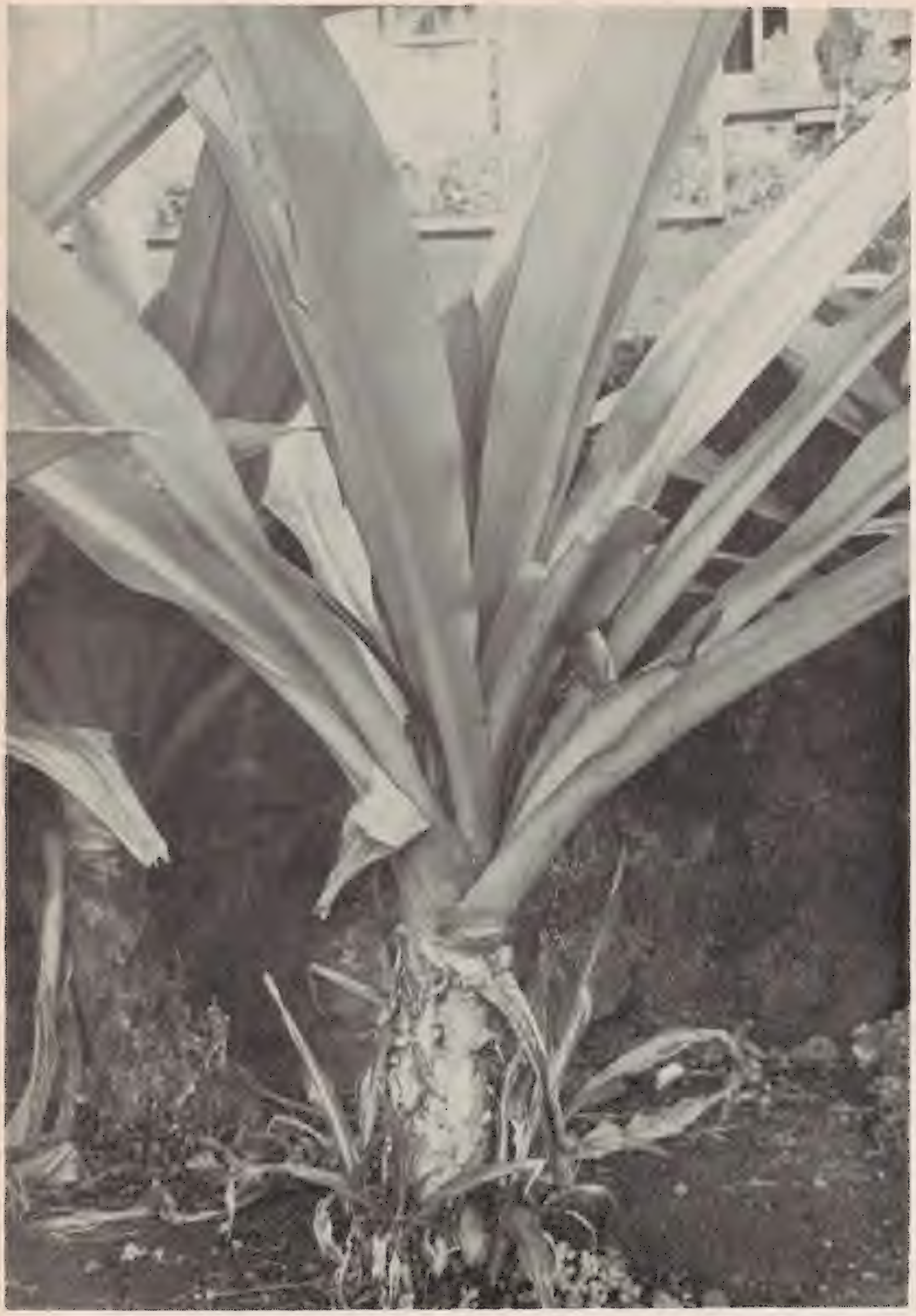

Fig. 2. The *Crinum amabile* cultivated in Hawaii, usually called *C. asiaticum* in error. Note the long aerial pseudo-stem extending down from the attachment area of the leaves. Offsets have to be removed often to prevent a large clump from forming. Photo by Mike Keesling.

bulbs had been planted rather deeply, thus the bulb shape and arrangement of the leaf base attachment could not be observed to determine if the plants were *C. amabile* or *C. pedunculatum* (*C. pedunculatum* has a large urn shaped bulb which pulls down into the mud. It is topped by a well sheathed neck which comes up to the surface of the ground. *Crinum amabile* has the basal root trunk, as described; otherwise the foliage is quite similar between the two species.)

Our first introduction to *C. pedunculatum* actually growing in the native state was along the Hunter River in N.S.W., Australia. This was some fifteen miles inland from New Castle. The bulbs were located in ditches and tidal flood areas over quite an extended area. Their foliage was three to four feet in length, relatively erect and quite heavy. A mature bulb may be some six or eight inches in diameter. They rarely produce offsets. Reproduction is essentially by seed which can be borne about by water. Hunter River is apparently the most southerly point for its natural range in New South Wales. A wider leaf form is described by John Weathers as native to North Queensland, and Redoute lists a Tahitian variation. William Morris has collected several related *Crinum* forms with narrower foliage from the Rockhampton and Pt. Mcquarrie areas. Thus this group needs further collection and study. The Hunter River form can endure light frosts, but a hard freeze will kill the bulb.

*Crinum flaccidum* is widely distributed throughout central New South Wales and northern South Australia. In general the bulbs grow in a heavy soil which becomes near boggy during the summer rainy season. They require a summer tropical storm to bring the bulbs into flowering. Winter frosts usually cut the foliage back but since the bulbs drive down 10 or 12 inches in heavy clay or 20 inches in sand they are quite untouched by harsh weather. Natural plantings were observed north of Quirindi, west of Coonamble and in several regions both west and east of Moree. In most instances *Calostemma luteum* was associated with *C. flaccidum* and was in flower at the same time. The latter bulbs drive down seven or eight inches into some very hard clay. Both *Calostemma* and *Crinum* are prolific seeders, but few seedling plants were observed. The wallabies often eat the foliage.

*Crinum flaccidum* was also observed growing along the bluffs above Mannum on the Murray River and in the Pichi-Richi pass on the west side of the Flinders Range. This last planting is quite unique as the blossoms are a deep creamy yellow. Rainfall normally occurs in South Australia in the winter, but both the Murray River and Pichi Richi beds were so located that the winter rains soaked into the soil between huge granite boulders in such a manner that the heavy clays were quite moist for the better part of the summer. These South Australian bulbs differ in some minor details in tepalseg and tepaltube length from the New South Wales forms mentioned above, but not with sufficient differences to justify a subspecific differentiation. The Quirindi form probably indicates the greatest degree of local group variation as some bulbs have rose-colored blossoms and others display relatively broad elliptical tepalsegs. Selected clones have promise of being availabe for future breeding purposes, but the rank odor of the blossoms rather discourages the use of these plants in a small garden.

Several clones of Bidwell's variations of *Brunsvigia* x *parkeri* were in flower when we visited the Sydney Botanical Garden. This included Bradley's well known 'Hathor' along with an outstanding variable pink clone known as 'Superba'. The latter bulb is well worth introducing to California. Back in the 1935 issue of HERBERTIA George Cowlishaw reported that the first white flowered Bidwell hybrid had appeared about 1860 in a group of Bidwell's seedlings planted at the Macarthur estate in Camden, some twenty five miles south of Sydney. This well known estate still exists with much of the arboretum quite intact. It was here that Lady Parker as a girl crossed some bulbs, probably of Bidwell's stock, and produced *Brunsvigia* x *parkeri* forms. Presumably plant breeding was no secret to her as her grandfather, John Macarthur, who is well known in early Australian history, developed the Australian Merino Sheep, and her father James and uncle, William Macarthur, had spent years collecting and breeding a vast collection of agricultural and horticultural plants from Europe and America, and much of this work was carried out at Camden. We did not have the opportunity to examine the garden for any evidence of Bidwell's bulbs, but his hybrids are widely distributed throughout Sydney and Parrametta gardens. These can be distinguished by the typical radial umbel which contrasts quite distinctly with the compact phototropic umbel of *Brunsvigia rosea* and *B. major.* In fact very few pure *B. rosea* or *B. major* were to be seen and these were of a different wild form than the clones normally seen in California. It is quite probable that the heavy tropical type of summer rains in Sydney tend to rot species material unless it is grown in very well drained soil.

Adelaide had a vast number of *B.* x *parkeri* and *B. rosea* clones in many gardens, and as mentioned, the Adelaide Botanical Garden had an excellent collection of Crinum species, although most of the subtropical species were suffering from the dire want of more water.

Two forms of hybrid *Brunsvigia josephinae* turned up. The *gigas* form (See plate 14, Plant Life 1960, p.42) apparently develops its great size due to two extra chromosome fragments, whereas a second form grown in the Melbourne area and known to the cut flower trade as the 'Giant Nerine' has only 5% viable pollen. From the color of the blossoms and the uniformly short length of the pedicels this latter plant may be a cross with a Nerine. But irrespective of the missing parent, the plant does produce a beautiful umbel, and the bulbs must exist in the thousands in order to be able to supply the many florists in Sydney with such quantities of cut flowers in mid March.

No amaryllids are native to New Zealand and only a few *Crinum moorei, C. bulbispermum album* and *C.* x *powelli album* were to be seen. However, *Agapanthus* has been very popular; and during January *A. umbellatus, A. africanus* and *A. africanus albus* were to be noted in practically every yard. In a number of instances *Agapanthus* have become escapes. At the Stevens 'Bastia Hill' gardens in Wanganui we saw several *Bomarea* species, including a spontaneous cross which occurred in the garden. This latter plant is one of the most vigorous bomareas ever observed and it is hoped that rootstock material or seeds can be obtanied in order to propagate the plant over here. I believe that Major Pam furnished Mr. Stevens with one of the parental plants.

One experience is well worth noting. If *Crinum amabile* is to be imported from Hawaii it is necessary to have the bulb cleared at the Agricultural Inspection Station in Honolulu. In order to avoid delay and a costly nematode examination of the roots it is only necessary to have the inspector cut off the roots and lower portion of the basal root trunk. The bulb, which contains the growing plate and trimmed foliage can then be classed as a 'Plant cutting'. The shortened basal stump will regenerate roots in sixty days or so by plunging the bulb into damp sand.

## PLANT COLLECTING IN MEXICO AND GUATEMALA

T. M. Howard, *Texas*

For my third year in a row, I returned to Mexico in 1964 for a two weeks summer period of plant collecting and adventure. This time I also took a small peck at collecting in Guatemala as well. Some readers may recall that I first made such a trip in 1953 (See HERBERTIA 1954), but what they may not know is that I have been doing it almost ever since. I made notable collecting trips again in 1954, 1955, and 1957. There was a lull of five years until 1962 in which I devoted my efforts to establishing my livelihood as a small animal practitioner in the Veterinary Medical profession, during which time I managed to devote my gardening activities to plant breeding, with particular emphasis on *Zephyranthes.*

In 1962 I made several trips, driving as far as Oaxaca, in Southern Mexico. In 1963 I went much further, to both Yucatan and Chiapas, almost 150 miles from the Guatemala border. I was determined to explore new territories, as new highways became accessible. In this respect I have been more or less competing with Mr. and Mrs. Morris Clint in a friendly rivalry in searching for new plant material. Because of my five year period of idleness in the collecting of plants, I knew that I had a monumental lead to overcome and the task would not be an easy one. I had to explore in new territories and this meant traveling much greater distances. My last two trips have each covered an excess of 5000 miles.

For 1964 I chose to drive Westward to the Pacific coast and then turn Southward and drive down the coast to Tepic. From there I turned Eastward to Mexico City and then down to Acapulco. Returning Northward, I turned Eastward at Cuernavaca and then drove on down to Oaxaca and then Guatemala. I returned to Texas by way of Mexico City and the Central Highway. The trip took 16½ days, along with two blown out tires, several flat tires, and the repair of a punctured oil pan. The last named was the result of driving for several hours in the rugged unpaved highways in Guatemala, after crossing the Mexican border. In spite of what you may have read, the Pan American highway, though now open, is a long way from being completed for comfortable vacationing. There are fine sections of paved highways in the Guatemala interior, but roads leading to its Mexican border can really rough up a car, especially during the rainy season.

I left San Antonio, Tex., on a Saturday afternoon, June 27, 1964, in company with Chris Abee, a teen-ager under my employment for several years. He was invaluable in helping me to keep records, and assisting in the digging and counting, as well as cleaning and labeling of the bulbs and plants that we dug. My trip was several weeks after an earlier trip in June made by Mr. and Mrs. Clint. She had informed me upon her return that she had been too early, since the rainy season had not yet really started, and that she felt I would be more successful because I was leaving at a later date. I must admit that I was pretty confident because past experiences had shown me that the first week in July was ''prime time'' for collecting in Mexico. Indeed the 4th of July Holiday season finds an abundance of rain in Mexico, and flowers in bloom everywhere.

The first afternoon and entire night were spent in entering Mexico and crossing the arid Coahuilan Desert. By early morning I was in the Eastern fringe of the State of Durango. I stopped to make my first plant check and dug a few bulbs of *Zephyranthes longifolia* with withered blooms and seed capsules. This proved to be the only *Zephyranthes* species that we found in the State of Durango, though there are said to be other related species from that state. We were seeking any and all bulbous material, and not confining ourselves to the Amaryllis family alone, and because of this, practically every stop was likely to have something of interest awaiting us. Nearly every region was to be represented by some member of *Oxalis, Milla, Sisyrinchium, Anthericum, Manfreda,* or a member of a bulbous irid allied to *Tigridia.* I shall refer to *Tigridia* and related genera as ''Tigridioids'', since many of them are still not completely classified.

Our second stop in Durango that morning yielded our first of endless *Anthericum* species of the Lily family to be found in Mexico and southward. This one had not yet come into flower, but it had narrow glaucous green leaves growing in a rosette, and the usual fleshy roots. Not a momentous collection to be sure, but I felt that our luck was warming along with the rising sun. A few miles Westward on Highway 40, I stopped again to dig a few *Oxalis,* some corms of the ubiquitous *Milla biflora,* and an equally widespread little yellow flowered *Sisyrinchium* species with tuberous roots. Both this *Milla* and *Sisyrinchium* or other related species within their respective genera were to be found nearly everywhere that we went in Mexico.

My first major collection for that morning occurred a little later that Sunday morning at Kilometer 860, when I spotted a really beautiful white *Anthericum* species flowering alongside the highway. It was a showy plant of large proportions, with its broad glaucous leaves and sparkling white flowers on stems 1-3 feet high. We dug a number of these plants since it seemed that here might be an *Anthericum* with better-than-average garden value. Our biggest surprise came later that morning as we were about 30 miles East of the city of Durango. There at K 921 we found our first amaryllids, a species of *Hymenocallis* new to me. The recent rains had brought them out of their dormancy and they were in full bloom along the roadsides and adjacent fields in open areas in heavy black soil. I have not yet identified this *Hymenocallis* and it may well prove to be a new species. I had not expected to find any *Hymenocallis* until we reached the Pacific coastal areas, and this one took me completely unawares. I thought perhaps that it might be either *H. sonoriensis* or *H. horsmanii,* since I had seen neither, but if so, it was too far southeast for the former and too far northeast for the latter. I was to learn later that it was neither. This species had 4-6 shiny upright green leaves about an inch wide, of rather compact size, and showy white flowers of typical *Hymenocallis* form. The staminal cup was of good size with rounded ''teeth'' between the filaments, which made it appear that someone might have done the art work with a pair of scissors. It seemed to lean towards the ''Mexicana Alliance'' within the genus, but it lacked the dull glaucous leaves which typifies so many species of that group. There were about six flowers per scape, and casually, from a distance, it reminded me a good bit of our native *H. liriosme* from Texas and Louisiana. A closeup inspection proved that this was not the case. Like other members of the Mexicana Alliance, this species produces nearly all its leaves at one time, and remaining green until the end of the growing season, the rainy season. Though it grew in fairly low and flat terrain of the plateau, the ones that we saw for the next few miles could not be called swamp or river bottom plants, though they grew in fairly wet grounds which likely stayed wet for a time after rains. The altitude in which they grew was slightly over 6000 feet elevation. From a gardeners viewpoint, this Durango species is a very pleasing addition to the group. A compact plant slightly over a foot high, it has flowers that are average or better in size of staminal cup, and tidy habits. It differs from *H. sonoriensis* in having longer, wider leaves, and a much larger staminal cup. It is probably larger in other dimensions as well. It does not have the glaucous leaves of *H. horsmanii,* and its foliage is more upright, longer, and more swordshaped. The flowers are larger too, with a larger staminal cup.

After passing through the city of Durango, we climbed into pine forested mountain country and stopped several times to collect several small species of *Oxalis* growing in open areas. One was a plain little lavender-pink species, while another was a compact growing yellow species with thick carrot-like root. The latter reminded me of a little weedy oxalis with small yellow flowers that plagues my bulb beds, but this one had larger, handsomer blooms, and of course, those weird finger like tuberous roots, orange brown in color. I decided that it had garden value and dug a few. I only hope that it minds its manners under cultivation.

I was still purring over my good fortune in the new *Hymenocallis* East of Durango, when I rounded a mountain curve and spotted another surprise growing above the road. Seeing a flash of red, my first thought was that I had found *Bravoa geminiflora,* a cousin of the common garden Tuberose, in flower. Instead, it proved to be a lovely *Sprekelia* growing in a little colony on this mountain side. We found several more in flower and dug a collection of them. Undoubtedly this was a form of *S. formosissima,* and the medium sized flowers were rather typical of others of that quite variable species that I have found in other areas of Mexico. What intrigued me was finding it in Durango. I had found it much farther south and east, but did not suspect that it grew this far west and north in Mexico. Such is the curse of ignorance. I was later to learn that it extends even farther north, into the state of Chihuahua. But for now, the finding of it was a thrill. Even Chris, who is no flower lover, was impressed with the classic orchid-like form of this red amaryllid.

Shortly after noon, continuing westward, I found my first bulb irid, the beautiful *Tigridia dugesii* flowering in a clearing in a wooded area high in the mountains. This little *Tigridia* is a member of a large, but little known group of species within the genus that grows over a large part of Mexico. Those accustomed only to the popular *Tigridia pavonia* garden hybrids will scarcely recognize these little wildlings as tigridias, as they are much smaller, shorter, and daintier. This species, *T. dugesii,* was later identified by my friend, Elwood Molseed, a student at the University of California who is doing graduate work on the Mexican tigridioids. Thanks to his efforts, a lot of mystery of this group is being cleared up. This particular species has bright golden-yellow flowers, speckled in the center with tiny dots, but in typical *Tigridia* fashion, on 6-10″ stems. After flowering, they grow vigorously for a while until they become dormant. *T. dugesii* and its close allies flower in advance of their foliage, producing but a leaf or two along with the blooms, and then more leaves later. I had been using my camera all morning, and I took full advantage of it in thoroughly photographing the beauty of this little irid. I could not wait to see the color slides later on after my return.

A bit later, we made another collection stop in the mountains to dig other odds and ends in the bulbous line. Alas, I could not begin to identify all of them, as most were not in flower. At one notable spot, I stopped to dig leafy things that appeared to be of the genus *Manfreda.* With them grew other ''things'' with fleshy tuberous roots and wide deep green leaves growing in a rosette. I had not the faintest inkling of what it might be, save that it was likely in the Lily family, and distantly akin to *Anthericum.* We dug *Calochortus* here too. These are sometimes called *Cyclobothra* in Mexico, but I am not sure how they differ, if at all. The genus *Calochortus* is well represented and distributed throughout Mexico, but they are little known. Certainly I can't differentiate between them. Since they seem to flower later in the summer, I rarely find them in bloom, but often in leaf. Though widespread, they never seem to be common. Naturally we found a species of *Oxalis* at this spot, but more importantly, I found a very unusual tuberous rooted member of the genus *Tradescantia* that seemed to have more appeal than practically all others of that group. Had I not seen the flowers, I would have never guessed that it was a member of that genus. Though the fleshy tuberous roots were not unusual, they were grossly more like those of *Anthericum* or *Sisyrinchium* than any tradescantias that I have seen. The narrow grassy leaves were not usual for that family either, nor was the stiff little wiry flower stem that rose about 10″ above the slender foliage. Only the small bright rose-purple flower pointed to the family characters. It was as if this little plant wished to pass itself off as a member of some other bulbous family member and was trying to do it from root to flower. It had almost succeeded. One might have perhaps guessed it to be a dainty terrestrial orchid. I dug a few of these and they seem to be growing happily now. This is one jewel that I hope to propagate and introduce for distribution.

At another spot, high in a magnificent mountain valley, with bright green meadows surrounded by forests, I dug what I supposed might be a species of *Bravoa,* but since it was not yet showing any signs of flowering, I could only guess. These grew in filtered shade under trees along with a species of terrestrial orchid. I dug some of these ''bravoaoids'' and paused to soak in this fantastically beautiful alpine country. Flowers were in bloom everywhere and the sight was breathtaking. Everything was cool and green and springlike. It did not take much imagination for me to believe myself transposed to some valley in Switzerland in early summer. Very shortly afterwards in this early afternoon I found my second *Tigridia, T. violacea* flowering along a roadside ditch, many of them standing in water. They were a good deal like the yellow *T. dugesii* we had found a few hours earlier, but these were in many shades of violet, grew in clumps rather than singly, and seemed to have more flowers and buds per scape. Some were nearly white with shadings of palest blue-violet. Others were deeper in hue approaching light purple. We had to remove our shoes and socks and roll up our trousers to dig these out of the mucky clay. We washed these on the spot and placed them in plastic bags so that dehydration would be checked. I found that these plastic bags were indispensable in preserving living material.

That gorgeous afternoon was not to last though, and neither was our plant collecting luck. Before long it began to grow cloudy and then foggy and damp. Though late in June, the cold air of the high altitude forced us to roll our windows up and turn on our car heater. We were beginning to cross the ''hump'' of the high Western Sierras, and rainy mist and fog dampened our high spirits. The day was getting on, it was wet and cold, we hoped to reach Mazatlan before nightfall, so we did not make any more stops. I did not see any plants, while driving, that interested me anyway, just forests of pine trees and other deciduous hardwoods. There were no towns, only occasional villages, and tiny ones at that. We did not find any place that we had cared to eat in, so we had skipped lunch. The promise of a seafood supper in Mazatlan spurred me on. As we raced westward towards our Pacific goal, we did begin to drop slightly in altitude and began to see bromeliads growing in the trees in these mountains. The only ones that I recognized were *Tillandsia* species that grow best at high altitudes. I was surprised to find one of these to be *T. prodigiosa,* an epiphytic beauty that I had previously seen only near San Cristobal de las Casas, Chiapas, in the southern tip of Mexico, about a thousand miles to the southeast. The long red colored influorescence lolled over the side of the plants and hung downward below the base of them like red ribbons. We began to drop more in elevation and began seeing more and more *Tillandsia* species and other bromeliads, many of which were terrestrial kinds. Long snaky *Cactus* hung above the roadside against the mountains with brilliant red flowers. I could not identify them nor did I wish to risk my limbs to attempt collecting them. We continued our dizzying descent and the mountain curves seemed endless. I have driven in mountains all over mountainous Mexico . . . thousands of miles of them . . . but this was ridiculous! Mountain after mountain after mountain seemed to extend outward in every direction seemingly to the ends of the earth. It was one continuing curve after another and we wondered if there really was such a place as Mazatlan. I knew that I had not completely lost contact with the rest of the world when I saw a road marker proclaiming that I had crossed into the State of Sinaloa. Our spirits began to rise. But the mountains continued to be as monotonously countless as ever. We had dropped a bit more in altitude. It was not cold anymore, and it was noticeably dryer, though the country had obviously had the beginnings of summer rainfall. I had given up any hopes of finding any more plants for this day. There were only a few hours of daylight left, and we wanted to get to Mazatlan before dark. But the biggest surprise was yet to come.

Hurtling around a mountain curve I saw a spectacle that really fired up my adrenalin into overdrive. There before my eyes was an entire mountainside carpeted with a tremendous colony of a startling *Hymenocallis* species in full flower. I stopped my car and jumped out, and was surprised to find the air heavily perfumed with the fragrance of the thousands of *Hymenocallis* flowers. They grew under trees and shrubs, and in the open clearings as well, showing that they were indifferent to sun or shade. This in spite of the fact that they had startling petioled leaves of bright green, which reminded me of a *Eucharis.* Each flowering plant had four broad leaf blades arranged in a whorl above the petioles. Towering above these leaves was an umbel of pretty white flowers of typical *Hymenocallis* form. I kept my camera busily clicking, taking shots of entire colonies, groups, individuals and closeups. Setting my camera and camera bag containing various lenses and attachments on a silver painted roadside post, I set upon the task of digging bulbs. I was surprised to find that there was no evidence of a single offset on any of the bulbs that we saw or dug, and the bulbs themselves were quite small in size for *Hymenocallis,* about the size of a ping pong ball. Apparently this species increases very successfully by seeds alone, judging by the size of the colonies. This plant proved to be an enigma. Outwardly it would seem to fit into the *Speciosa* alliance as outlined by Dr. Traub, since it has broad thin foliage with distinct petioles as seen in *H. speciosa* and other members of that alliance. But the growth habits and also the flowers seem to lean more strongly toward the *Mexicana* Alliance. Like the other members of the *Mexicana* Alliance, this new petioled species lies dormant until the rainy season starts, produces all of its leaves at one time simultaneously with the flowers, grows for a short period and then becomes dormant at the end of the summer. Casually the flowers resemble those of *H. horsmanii* and *H. repanda.* Only study will reveal if it belongs in the Speciosa Alliance, or is an offshoot of the Mexicana Alliance, mimicking the former in its foliage. Certainly it is a most distinct plant and not likely to be confused with any other.

Thus Sunday, the 28th of June, 1964, was a red letter day for *Hymenocallis.* I had found two very distinct species that were new to me, and perhaps even new to science. I was very happy as I drove into Mazatlan. I had quite a collection of choice plant material, and I had made Mazatlan before dark. After leaving our collecting spot, I had seen this petioled species by the thousands in huge colonies on mountainside after mountainside, until we dropped to a lower and dryer elevation. After that we did not see them anymore. The country around Mazatlan and southward down to the Sinaloan coast was still bone dry. The rains were late. There were no bulbs to collect anywhere or much of anything else for that matter. This Monday was not my day. Too many tequila cocktails the night before had given me a horrible hangover. I don't know if the many changes in altitude had helped make me sick, but it was a blue Monday. I did not feel up to driving until almost noon. I let Chris do it. When I finally felt up to taking the wheel, we had a blowout! My spare tire was no spring chicken either. I now had no spare. I held my breath and crossed my fingers.

We crossed into the State of Nayarit, but it was still too dry to collect. As we neared the City of Tepic, things began to green up, evidence of recent rains, and we were gradually gaining altitude. I stopped to photograph a pretty coral *Stennorynchus* species, a terrestrial orchid, in flower and it was then that I discovered the loss of my camera containing all of the valuable pictures taken to record the events of the day before. I wondered if that camera (with accessorics) was still resting on that silver roadside post by the *Hymenocallis* colony with the petioled leaves. A speedometer check revealed that I was now about 300 miles from that spot and the chances of retrieving the camera were too small and would throw the entire trip out of kilter. I had a spare camera, but no closeup lenses, and I had lost film that was even more valuable to me at the time than the camera itself. I still wonder just WHO found that camera and what they did with it? If they went to the trouble to process that color film, I'll bet they were surprised to see all the flower pictures. Certainly I had left my camera in a very accessible spot. I was really in a grim mood now, and only something surprising could elevate my spirits. Luckily that was not long in coming.

A roadside stop check in this hilly country revealed a variety of bulbous things. A narrow leaved glaucous *Hymenocallis,* not yet in flower, *Oxalis,* Anthericums, Manfredas, Besseras, *Cipura palludosa,* a pretty early morning flowering tigridioid, *Hypoxis* species, and a plant that looked like a *Crinum* in leaf, but that had fleshy tuberous roots. None of these were yet in flower, but it was obvious that we had again hit ''pay dirt''. These were dug at K 927, and I was thankful to again be on a highway that had kilometer markers. The highway of the previous day had been poorly marked and I had been at a loss to record my collecting sites. A few more miles southward, at K 892 I found *Hymenocallis horsmanii* in full bloom. This was my first experience with this species. They grew in profusion on the hillsides. I stopped to dig these and found to my surprise that a second *Hymenocallis* species grew along with them so that sometimes mixed colonies of two species could be found growing together. Only *H. horsmanii* was in flower, while the other showed no evidence of buds showing. The foliage of *H. horsmanii* was considerably broader, especially broader at the middle of its length, and the leaves were more lax and lay close to the ground. Bulbs of *H. horsmanii* were smaller, and it was not unusual to find one flowering with a single flowered scape from a bulb less than an inch in diameter! The other species, which had been tentatively identified as *H. repanda,* had narrower, more upright foliage, larger and deeper-seated bulbs. The foliage was more numerous and they flowered later. This was demonstrated by dissecting several bulbs and removing the embryonic buds which were already deep in the neck of the bulbs. Upon returning from my trip, I planted bulbs of *H. repanda* and a few of these flowered in late July and early August. The flowers differed slightly in form from *H. horsmanii,* and this came as no surprise.

*Hymenocallis repanda* has been kicked about over the years. My opinion is that earlier botanists, for the most part, failed to see that there were two separate species growing in the Tepic area, since they grow together and both have glaucous foliage. The fact that they flower a month apart was likely overlooked. A botanist working such an area one month is not necessarily going to comb the same area several weeks later. He may move on to other territory. Also the fact that *Hymenocallis* are still flowering a month later may not necessarily seem unusual to him. He may assume that they do not all flower at once and that they flower over a long season. Not all taxonomists pay as much attention to leaves as they do to flowers. The few taxonomists that did take note of *H. repanda* were rewarded by having it thrown into synonymy with *H. Horsmanii.* I earnestly hope that this little mystery can be settled once and for all with a study of collected specimens.

Nearing the Northern limits of the city of Tepic, I spotted a flash of pink along the roadside and I stopped to investigate. Beneath my feet were a large colony of a remarkably showy white *Tigridia* species, *T. passiflora* (Molseed). The flowers were similar in form, but larger than either *T. dugesii* or *T. violacea* that I had seen the day before in the State of Durango. Growing with them were scattered colonies of a pretty pink flowered *Zephyranthes* species. These were our first *Zephranthes* since we had collected *Z. longifolia* the morning of the previous day. Many of these *Zephyranthes* flowered from bulbs only ¼-½″ in diameter. The flowers were of medium-small size and showed very little color or form variation. All had moderately long, narrowish segments, and shiny green leaves. Though pretty and dainty, they seemed rather less distinguished than other *Zephyranthes* that I have collected in Mexico. The following day I was to again find this species growing just east of Guadalajara in the state of Jalisco.

We ate a late lunch at Tepic and then proceeded towards Guadalajara, where I hoped to spend the night. A few minutes after leaving Tepic, we encountered a heavy downpour of rain, but in a matter of minutes we had passed throngh it and were in sunshine again. I stopped to check and collect a few more bulbs of *Tigridia passiflora* at K 869. This turned out to be another wonderland of bulbous material, and we made the most of it. There were white anthericums, *Milla biflora, Bessera* sp., and some large Manfreda-like plants. The Bessera were not yet in bloom, but many of the buds were beginning to show some red coloring. Mrs. Clint had collected both red and violet colored *Bessera* the year before in full flower and had sent me a few of the violet forms. I had flowered one of these before leaving on this trip, and it was obviously different from *Bessera elegans* that I had collected in 1957 in the State of Guerrero. Mrs. Clint had assumed that the red ones that she collected in Nayarit were *B. elegans,* and that the violet ones were something else. It now appears that both the red and violet forms are both color varieties of a single species, but neither of them is the same as *B. elegans* that grows in the state of Guerrero. The latter has coral-red flowers with broader segs, It is more robust, and I have never seen any color variation in it. Even the pollen of these two species differs in color. The red variations in the Nayarit *Bessera* are carmine-red rather than coral-red. More study will be needed to determine if they really are two separate species, but meanwhile gardeners can rejoice in the addition of new color shades to this charming genus.

Continuing eastward on Highway 15, I spotted a large pure colony of *Hymenocallis* in leaf at K 859. The foliage was upright, narrow, and glaucous, and the plants fairly compact. No plants were yet showing any evidence of flowering, though the bulbs were of moderate size. I dissected a few of these bulbs to find that they would be in flower in another few weeks. I am inclined to think that these bulbs were the same species that grew with *H. Horsmanii* North of Tepic, the only difference being that these seemed to be a bit more robust, perhaps due to better growing conditions.

Entering the State of Jalisco, I stopped to collect an unusually showy large flowered oxalis with dark rose-pink flowers and robust habit. Indeed it is the prettiest *Oxalis* that I have seen of this type, the flowers reminding one of *O. bowieana.* The bulbs of this species were huge, by *Oxalis* standards, some being 2″ in diameter, and growing to a depth of six inches, which made them rather hard to dig without injuring them. The giant leaves were slightly hairy. I have not yet identified this one, but have a hunch that this is likely one that has likely been in cultivation for some time.

Our last collection for that day came just before sundown, just outside the western outskirts of the little town of Magdalena, Jalisco. Some roadside *Hymenocallis* in flower caught my eye and I stopped to check. The rather narrowish swordlike leaves were a dark glaucous dull green and the plants were of medium size. I could not figure out just what this species might be. Certainly it was not *H. repanda,* nor was it Mrs. Clint's #658 (*H. Riparia?*) that grows both north and west of Jalisco. Once again only further study can reveal just where this species fits in. It may turn out to be a variation of Clint's #658, or perhaps another species. Though in flower, it was getting late and we were in a hurry. Rain clouds were building up and there was a storm in the offing. We did not really take the time to study the flower, but there seemed nothing unusual about it at casual glance. I did take enough time though to dig some odds-and-ends of bulbs that were growing along with these *Hymenocallis.* There were some *Hyporis* sp. with heavily reticulated tubers, a few small yellow *Anthericums* and a narrowleaved Bravoa-like little thing that is now a real ''Whatzit'' in my garden. Though I have not yet flowered it at this writing, I cannot for the life of me figure out what it might be. I am certain that it is akin to *Bravoa* and Tuberose, but that is all. This is one of the things that I really look forward to flowering someday.

By this time it was getting dark, so we drove on to Guadalajara, through rain, and spent the night there in an ultra cheap Hotel, complete with cockroaches. (We were trying to save money). The following morning after much shopping, I bought a used recap tire and tube, and we once more had a spare. It was a good thing too, our former ''spare'' was beginning to look pretty bald on the ground. It was only a matter of time . . . .

Leaving Guadalajara the following morning, we spotted pink *Zephyranthes* in flower, in an area midway between that City and Lake Chapala. These turned out to be the same species that we had collected just north of Tepic the day before, save that these were a bit more variable in shades of pink. I also found *Allium* species growing in wet spots in this area. These were not in flower, but I presumed it to be *A. glandulosum* or one of its allies. Here too grew a very showy rose colored *Oxalis* species of a very dwarf type, an unusual cream colored little tuberous rooted *Sisyrinchium,* and a violet purple *Tigridia* species.

A few miles closer to Lake Chapala we found another *Hymenocallis*, the old familiar species that Mrs. Clint had collected as #658 in 1955. These were growing in very wet places along the roadside and were in full bloom and growing in large clumps. I did not bother to dig any of these as I had a fair supply in my garden, but I was interested to find them in a new collecting site. Those of Mrs. Clint had come from 25 miles north of Guadalajara, while these grew nearly midway between that City and Lake Chapala. Some people feel that this species is *H. Riparia.* It is a handsome and tidy species, but to me rather undistinguished in flower.

Upon reaching Lake Chapala, I kept my eyes cocked for *Hymenocallis mexicana* (syn. *H. dillenii*) the #604 of Mrs. Clint's earlier collections, which she had found growing near the lake in June of 1955. Since we had always referred to it as her ''Lake Chapala'' species, I had assumed that it carpeted the area surrounding the lake. It was not until I approached the eastern limits of that Lake and the Michoacan state line that I finally caught a glimpse of a large colony growing among lava rock. These were as thick as thieves and I dug them out of the rocks until I was satisfied. They were in full bloom. It is a very dainty little thing and most distinct, with its unusual outward facing flowers with short curved tubes. Mrs. Clint has found her largest populations in Jalisco, and extending into the adjacent states. Certainly they are well represented in Michoacan as well with heavy populations, where they may be seen growing in abundance along the roadsides in the plateau country on the road to the city of Morelia. It seems to show little or no variation anywhere that I have seen it.

Later that day, at K 488 on Highway 15, we found a colony of pink flowered *Zephyranthes* growing with a large number of *Nothoscordum bivalve* and purple flowered *Tigridias.* We began digging bulbs of these here, but a sudden shower soaked us to our skins before we could finish. Gaining altitude in pine covered mountains, I looked for *Bravoa geminiflora* in flower, but did not find any bulbous plants of any kind. It was a very rainy afternoon and it was still raining when we pulled into Morelia that night. We were lucky in having bought a tire in Guadalajara for a spare that morning, as we had a flat in a small town just before arriving in Morelia. I had to delay leaving Morelia the following morning so that I could have the tire vulcanized and a tube placed in it. Tubeless tires are not yet in vogue in Mexico, and it is best to have tubes placed in any tubeless tires that become flat.

Leaving Morelia the next morning, we stopped just a short distance beyond the eastern limits of the city to trudge up a mountain side to check if there were any sprekelias. We did not find any, but we did find a small hairy leaved yellow *Anthericum*, and some unusually large flowered *Milla biflora. Zephyranthes* also grew along with them, but these had already flowered. Naturally it began to rain again as we dug, and we were about to give up, when it stopped as suddenly as it began. Still not content, we decided to walk still higher up the grass covered mountain side. It was a good thing that we did too, for at a higher level

I came upon a colony of *Bravoa geminiflora* in full flower. I had never before found such a large number of them in bloom, and the 2-3′ wiry stems with their pendent coral-red fire-cracker-like blooms were a most intriguing sight. Growing with them was a species of *Calochortus* showing buds, and a tiny little *Anthericum* species with white flowers and flat, shiny green leaves, pressed against the ground.

Driving a few more miles eastward, at K 282, I made a routine check stop by a wooded mountainside to see if I could find any *Sprekelia.* I walked along the roadside and followed a little trail but found nothing but a few *Calochortus.* I walked back to the car and got in and was just about to drive away when I glanced upward and saw a colony of *Sprekelia* in seed and leaf. The leaves of some were nearly three feet long. They had been right there over my head, but I had been looking elsewhere. These were the largest *Sprekelia* bulbs that I had ever seen. Growing with them were large iris-like plants with tuberous roots. These were undoubtedly the same giant yellow flowering *Sisyrinchiums* that we were to find in flower in Southern Mexico.

Continuing eastward, we stopped at K 222 to dig bulbs of a purple flowered *Tigridia,* the same one we had dug the day before in the rain. These grew in a huge colony along the highway in heavy soil, with many of them standing in water. A robust, but compact growing species, this one should grow well under cultivation. At this spot we found an armful of freshly picked *Bravoa geminiflora* lying on the ground. Apparently these had been pulled by children and then cast aside. One stem still had a bulb clinging to it, and I put this into a sack with our other Bravoas. It is strange how ruthless and wasteful people can be in expressing love for flowers.

Later in the afternoon, as we neared the city of Zitacuaro, at the eastern limits of the State of Michoacan, I stopped at a spot where I had collected in 1957. This was a corn field in which grew an interesting assortment of bulbs, including *Sprekelia, Allium, Sisyrinchium, Bomarea, Anthericum, Oxalis,* and a large colony of *Tigridia meleagris.* To the uninitiated, this *Tigridia* comes as quite a suprise, as it has very un-*Tigridia*-like flowers. The large pendent bronzy-purple flowers hang like large bells at the tips of the scape, much like a *Fritillaria.* The *Allium* species was not flowering, but it may likely have been *A. glandulosum,* a stoloniferous wine colored onion which is one of our Southernmost Alliums. The finding of a *Bomarea* species was an exciting event, though I was unable to keep the plant alive once I got this rare amaryllid home.

We spent the night in Toluca, state of Mexico, and of course it rained. We departed for Acapulco the following morning. Though less than an hour's drive from Mexico City, I decided to bypass the capital in order to save time. It was now Thursday, July the 2nd, and we still had much ground to cover. This highway, Highway 55, led to Taxco, the famous old colonial silver mining town, and I was later thankful that I chose to take this route as I found several new and interesting plants along the way. A few miles South of Toluca, at K 108, I stopped to dig a few bulbs of a plant that resembled *Polianthes tuberosa,* the common Tuberose, and it was no doubt related to Tuberose and Bravoa, but since it was not flowering, I will have to wait until it does before I can identify it. These grew with stiffish leaves lightly speckled with purple at the base. I am still looking forward to collecting my first wild Tuberose in Mexico, as this plant is supposed to originate there but it seems to be unknown in the wild! A bit further south at K 138 we found many bulbs of *Tigridia meleagris* in full flower along the roadside, and in stopping to check, found another *Tigridia* species in seed growing with it, along with Sprekelias, *Milla biflora, Allium* sp., *Zephyranthes,* Anthericums, and Sisyrinchiums.

A few miles north of the City of Taxco, in the state of Guerrero, we found another important addition to our collection. My first impression was that perhaps we had found a Giant *Bessera,* as the stiff hollow leaves were 3-4 feet long and a dark bluish green. Closer examination showed old dried flower stalks of the previous year, and the very long angled pedicles and withered seed pods seemed to indicate that it was another *Milla* species or one of its allies. Though the old flower stalk indicated a *Milla,* the leaves were certainly Bessera-like. Apparently this new *Milla* has a restricted range, as we did not see it any more after passing through this area. We ate lunch in Taxco, and it was a strong temptation to linger in this old city with its quaint cobble stone streets. After leaving Taxco, we drove toward the city of Iguala, the Capital of Guerrero, and a junction with highway 95 which lead to Acapulco. We saw many bulbs of *Bessera elegans* flowering along the roadside. Apparently this is a disappearing species, since cattle eat it and it seems now to be found in rocky cliffs and other such places inaccessible to livestock. Little wonder that it has become a rare plant in cultivation lately.

North of Chilpancingo, Guerrero, I stopped to collect a few bulbous irids, and *Calochortus* but these were not yet in flower. I am certain that these irids are the same as those that I collected in 1957 in this same area and which flowered with large golden yellow flowers that looked very much like *Nemastylis* in form. As this area was grazed by livestock, they were to be found growing under dwarf palms and in rocks where they could not be easily eaten. About a mile further South, around the bend we found large colonies of *Hymenocallis glauca,* a few Sprekelias, and scattered plants of *Bessera elegans* in flower. Nearing Chilpancingo, I spotted scattered colonies of an old *Hymenocallis* friend, a species that I had first collected in 1957, my #57-8. This is a rather dwarf type with low, ground-hugging foliage, and few flowered umbels topped by long tubed flowers which have strongly ''teethed'' staminal cups. Though it grows in the same region with *H. glauca,* this species is never found growing with it, since *H. glauca* likes the mountains, and this species likes low wet places in the valleys. I noted that the Kilometer readings for this species were K 350, and K 317. A bit later in the day I made my last *Hymenocallis* collection for the day, in a roadside river bed. These were wedged between rocks in the river, and also grew on the river banks, but were not in flower. I would not be surprised if this is the same Chilpancingo species, 57-8, since it grew in the same area at K 344, only six kilometers from my original 1957 collection. Bulbous plants seemed to play out as we approached Acapulco, and we decided to call it quits for that day.

Our 6th day was essentially a return up the same highway 95 from Acapulco to Cuernavaca, Morelos. Because this part of the trip was mainly a rerun, I did not anticipate finding anything new but overlooked from the previous day. As good fortune would have it, I was wrong, as usual. A ''Ho Hum'' check stop at K 216 in a semi-arid *Cactus* country where *Neobauxbaumia tetetezo* grows in profusion proved to be a bonanza. Growing beneath these columnar giants were numerous *Milla*-like plants with many thready leaves. They grew in profusion in the chalky soil of these dry hillsides. I first found a few dried flower stems and it was obvious that these were unlike ordinary Millias, and perhaps they might be something else. I then found a few of them in bloom and from a distance they resembled Alliums, but closer inspection revealed that some of the little white flowers had reflexed segments. The little corms were typical of the *Millinae* rather than the Brodiaeas; that is the tunics were membranous rather than fibrous. Were it not for this, I would suspect that perhaps they belonged to the genus *Muilla*. Perhaps they may be the long lost *Diphalangium graminifolium*. Only further study under cultivation will solve the riddle, but I am confident that we will know more about these little plants within a year or so. These were dug south of Iguala, Guerrero. Continuing a few more miles northward we found a white flowered bulbous irid, but I could not identify them since all flowers had closed by afternoon. I surmised that perhaps they might be either *Cipura* or *Eleutherine* species.

South of Cuernavaca, Morelos, I stopped to dig a few corms of a large white flowered form of *Milla biflora*, along with some purple-flowered Tigridias, and some orange yellow Antehricums with very slender leaves. I also dug a few *Manfreda*-like plants with purple spotted leaves. At Cuernavaca, I turned Eastward on Highway 115 towards Cuautla and a later junction with Highway 190, the southern leg of the Pan American Highway. Midway between Cuernavaca and Cuautla I stopped to check for evidence of *Hymenocallis graminifolia* which I had found in this area the two previous years. I have been particularly impressed with this very showy and very dwarf member of the Mexican *Hymenocallis* group and figured I could always use a few more. I found neither this *Hymenocallis* species, or the pretty white *Zephyranthes* species that grew with them, but I did find what may perhaps turn out to be another new *Milla* species or variety of *M. biflora*. It looked very much like the common species, save that this was a very dwarf plant with very short 6″ stems bearing but one or two flowers. The foliage was very slender and thread-like. Once again, it will take further scrutiny to determine the status of this most distinctive and charming little *Milla*.

We reached our junction with the Pan American Highway at Izcar de Matamoros, in the state of Puebla and daylight was drawing nigh.

We then turned southward and made a final stop a few miles south of the little town to dig a few bulbs of *Hymenocallis glauca* and *Tigridia meleagris.* Both of these plants seem to be fairly widespread in south-central Mexico. I now have collected bulbs of *H. glauca* (Herb,) Baker ex Benth & Hook, in the states of Puebla, Oxaca, Mexico, Morelos, and Guerrero, and this is undoubtedly the same plant that Herbert named *Choertis glauca* in 1837. This name was later changed to *Hymenocallis glauca* by Baker in 1883, and then to *H. choretis* by Hemsley in 1884. It was still called *H. choretis* in Sealy's REVIEW of THE GENUS HYMENOCALLIS, but Sealy admitted that perhaps the name *glauca* might prove to be more correct. I am inclined to follow Herbert's nomenclature since this is probably the commonest, most distinctive and most widespread species of the Mexican Alliance and undoubtedly was one of the first of the Mexican species to catch the eye of and impress Mr. Herbert, so much so that he even proposed a separate genus for it.

Also in this same area in Southern Puebla, I recollected corms of another old friend, a very pretty night flowering *Milla* species with dark bluish green nearly glaucous rushlike foliage. I had previously collected this plant in 1962 and 1963 a few miles south of Tehuacan, Puebla, but Mrs. Clint had collected it several years before in the State of San Luis Potosi. Oddly, this is a stoloniferous plant as well as being only a night bloomer, two characters that easily separate it from *Milla biflora.* The flowers do not have the peculiar ''scalloped'' base to each segment as do *M. biflora,* and the green stripes on the backside of the segments is much more distinct. The fragrance is much more noticeable as well. I have not yet identified this species, but it is a welcome addition to this charming group.

We spent the night in Huajuapan de Leon, a small town in the northern part of the State of Oaxaca. This is a very charming peaceful little town, but the Mexican Army was called upon to put down an uprising only as recently as 1962! Early in the morning found us on the road again in hopes of reaching the city of Oxaca by noon for lunch and a day of much needed rest and relaxation. Just a mile or so outside of the city of Huajuapan I collected a little *Anthericum* species with white flower that I had also collected the year before. This little dwarf is very showy and has wonderful garden value, since it blooms each morning from early summer until late autumn. The low glaucous foliage is very tidy and it makes an excellent border plant. It may later develop that many of my Anthericums may turn out to be members of the genus *Chlorophytum.* I do not know enough about their taxonomy yet to classify any of them. Judging by the great number of species I am not at all certain if all of them are yet classified anyway. Surely there are enough of them to merit a lifetime of study. Growing with these little pretty white Anthericums was a sessile white-flowered little *Zephyranthes* that was likely a southern corm of *Z. verecunda,* the familiar little yellow *Sisyrinchium,* and an odd little wine colored afternoon flowering tigridioid. This latter may prove to be a species of *Tigridia* or perhaps a member of another related genus. At K 374 we encountered one of the more spectacular *Sisyrinchium* species. This orange yellow species grew in the mountains south of Haujuapan and had flowers over an inch in diameter. Later that morning, while driving through a mist in the mountains, north of Yanhuitlan, Oxaca, I found yet another large flower *Sisyrinchium* which had pretty lemon yellow flowers and very narrow foliage. Strangely this species lacked the usual tuberous roots found in the other yellow species in Mexico, but instead had very thin fleshy roots too thick to be fibrous and too thin to be tuberous. This was one of the ''oddballs'' of our collection.

I was very eager to collect *Fosteria oxacana* (Molseed), a brand-spanking new genus of the tigridioid group, only recently recognized as late as 1963. I had collected this plant myself in 1963, but was unaware that it was unclassified until Mr. Molseed so informed me through correspondence. I found a large colony of them growing in a wooded mountainside at K 460. The small yellow flowers are more odd than showy and very different from anything else in this group. Growing with them was a species of *Schoenocaulen*, a little known member of the *Liliaceae* with plain greenish flowers. This one had peculiar heavily reticulated bulb coats. Later we collected more *Oxalis* species and another yellow *Anthericum*, but by this time I had lost count of the number of Anthericums I had encountered. Our last important collection for this 4th of July was an odd little bulbous irid from the mountains north of the Valley of Oaxaca at Siete Cabrillos, in the Cloud Forests where bromeliads were to be found in abundance in the trees. Surely not a *Tigridia* or anything else familiar to me in this interesting group, I was enchanted by its delicate charm and daintily fragile flowers which seemed to dance on their slender 10″ stems. At a quick glance one might think the translucent white 1½″ flowers were perhaps a species of *Tradescantia* in the Spiderwort family. Closer inspection showed that each bloom had three large showy segments with three tiny little inner segments, reduced to nearly bristles, which were blotched yellow and dotted with tiny purple spots. There were three long yellow stamens with a longer yellow stigma dangling to one side. The very narrow grassy leaves proved to be plicate on closer inspection . . . a characteristic of all tigridioids. There were sometimes two flowers open at one time per scape, and the bulbs seemed inclined to form offsets freely. As always, while collecting plants in Mexico, one is apt to draw curious natives to see what is being dug and this was no exception. Almost before I knew it, a man and his wife and their children were yanking handfuls of these irids and offering me bouquets. I thanked them, but explained that I was seeking only the bulbs and not the flowers. I later learned this little irid is *Sphenostigma conzatti*, a plant described by R. C. Foster in 1947 from material collected by Conzatti in 1907. Mr. Molseed tells me that my 1964 collection is likely the first time it has been collected or even seen since the original collection by Conzatti in 1907. It is easy to see why. This is a very early-morning flowering species and the flowers are usually gone before the suns first rays hit them. The fact that I was able to spot them was because the morning was unusually cold and misty, no doubt keeping the flowers in fresh condition longer than usual. Also I was up and about earlier than usual that grey chilly morning.

Arriving in the city of Oaxaca, we ate lunch, found a Hotel and napped. After cleaning up and refreshed, we went shopping, and in doing so, found a shop where a Kinkajou was for sale. This pretty little animal is sometimes known as a Honey Bear, and they make delightful pets. I made a down payment on the little animal and told the shop keeper that I would pay the balance when I returned from Guatemala in a few days and would pick up the little animal then. The next day, July 5th was a fairly dull day for collecting. We had a long trip ahead of us, driving from the city of Oaxaca, Oax., to the highlands of San Cristobal de las Casas, Chiapas. Normally the trip averages ten hours of driving and our average was not helped at all by our second tire blow out and the necessity to purchase another tire. The fact that nearly all businesses were closed that day because of a National Presidential election did not make the purchase of a tire easy. I might add that my car was equipped with a tire size that was not manufactured in Mexico and it was very difficult to find a tire that would come close to fitting! We lost three hours in looking for a tire in Tehuantepec and Juchitan in the Tehauntepec Isthmus before we could continue on our way. I did manage to take time to stop and collect a few bromeliads, and was especially pleased to pick off a few plants of *Tillandsia Carlsoni* north of Tehauntepec earlier in the day. It was nearly dusk before I stopped at Ocozocoautla, Chiapas, to dig a few bulbs of a *Zephyranthes* that I had collected in the same place the year before. For some strange reason, *Zepyhranthes* seem to become as scarce as hen's teeth in Southern Mexico. Except for a few *Zephyranthes brazoxsensis* that are to be found around the city of Oaxaca, I have not found any members of this group until reaching this point in Chiapas. Oddly, this Chiapas *Zephyranthes* seems to be identical to *Z. miradorensis* found much further north and west in the state of Veracruz. Why it suddenly turns up again here is one of those enigmas that makes plant collecting interesting!

We reached Tuxtla Guterrez that evening, but chose not to stop, but rather proceeded onward and upward to the mountain city of San Cristobal de las Casas where we would spend the night. The distance is only about 50 miles, but it is a steady climb all the way. This beautiful country has all the charm of Guatemala. Native amerindians still cling to their regional costumes, the climate is invigorating and it is a paradise for plant collectors, particularly those seeking bromeliads. I decided that we would return from Guatemala through this town and made arrangements to leave all of my plants with a Hotel attendant, picking them up on my return. I would thus not risk losing them in crossing the frontier and customs inspections with which I was unfamiliar. I had originally intended leaving my plants in the city of Oaxaca and I was later to regret not doing this instead. I have never found much in the way of bulbs in the San Cristobal area, though it seems like it would be ideal for them. I will admit that I was amazed to see amerindian women carrying boquets of cut flowers to market that included scapes of *Brunsvegia rosea* . . . and this in early July! The country is high and cool, and gets much summer rains and I did not expect to find Brunsvegias growing happily under such conditions.

We left San Cristobal, and drove towards the Guatemala border and did no more bulb collecting, though I stopped to admire some beautiful white flowered Calochortus of the ''cat's ear'' type in bloom. There is little reason to mention here all the details of our problems of crossing into Guatemala, other than to note that it can be costly unless one crosses during the limited time in which the border is officially open. The ''extraordinary service charges'' can make a dent in the day's budget. The roads leading from the border into the interior are horribly bad and unpaved, and are much worse during the rainy season. Naturally we arrived with the beginning of the rainy season, and I was well indoctrinated about the hazards of driving at this time before I had traveled more than an hour. The country is fantastically beautiful, but I failed to collect any bulbs while there other than a little stoloniferous *Milla* species. These were not in flower, but I later flowered them at home and they proved to be another night flowering species similar to the ones from the state of Puebla, Mexico. These differed in having slender, grassy leaves. We found these near Huehuetenango.

We lost time at Solola, near Lake Atitlan repairing a torn oil pan, and thus we decided to cut our trip short and return to Mexco by another route. This change in plans caused us more border delays and also more miles of driving than we had planned. The experience was a nightmare that I am in no hurry to repeat. At any rate, we finally *did* return to San Cristobal to pick up our plants and then drove northward to pick up our little Kinkajou in Oaxaca . . . sadder, poorer, and much, much wiser! In defense of Guatemala, I will say that the country is gorgeous, the people friendly, and prices more reasonable than we feared. My main complaints are the miserable highways leading into the country, and the hazardous conditions encountered. I am sure that someday this will be corrected. Highways in the interior are excellent. My other complaint is the absurd methods used to fleece tourists out of extra dollars with the many ''extraordinary services'' by employees of both governments. Tourists accustomed to crossing into Mexico from the United States will be rudely shocked when they try to return into Mexico from Guatemala. My advice is to fly.

The drive down from San Cristobal to Tuxtla Gutierrez proved to be pleasantly eventful and rewarding. We collected a few choice bromeliads and orchids, but I was really excited in finding a beautiful blue flowered irid, *Orthosanthus chimboracensis,* in flower in the mountains. The plant has the appearance of a *Sisyrinchium,* with the fan-like foliage of narrow grassy leaves. The showy sky blue *Aristea*-like flowers of this species are an asset to any garden. It has fibrous roots. The plant proved difficult to keep and none of my collection survived. A few more miles down the road, at a slightly lower altitude I found an amazing giant yellow-flowered *Sisyrinchium* with tuberous roots that proved to be the finest of all. The huge lemon yellow flowers were as large as a half dollar and the large Iris-like plants produced stems several feet tall, making them a worthwhile addition to any garden. Growing with them was a bulbous irid of the tigridioid clan, but since they were not yet in flower I could not determine what they might be. Not wishing to pass up any good bets, I collected some of these as well.

Later that afternoon, as I neared the Oaxaca state line in a scenic mountain area that overlooks the Pacific ocean I stopped to recollect bulbs of *Eustylis purpurea,* another attractive tigridioid that grows from Costa Rica to Louisiana. This one has attractive violet purple flowers. Growing with it was a species of *Hypoxis* with long carrot-like tubers. The leaves of this *Hypoxis* were conspicuously plicate and it was very difficult to distinguish between *Hypoxis* and *Eustylis* without first digging them. Also growing in this general area was *Cipura paludosa,* another pretty white bulbous irid, with icy white flowers opening early in the morning. This *Cipura* species is another very widespread bulb that is apt to be encountered over very large areas on both coast lines of Mexico.

Arriving in Oaxaca City, we went to the market to get a crate for our kinkajou and then we picked him up. Chris was really tickled with the antics of our new passenger, but it quickly became evident that ''Sam's'' energy was overwhelming and it was necessary to keep him in his crate lest he cause us to have an accident. At any rate, Sam was a welcome relief to the boredom of so many miles of driving and we really did not mind his playful bites (and resulting teethmarks) too much. Sam loved fruit and feeding him was no problem since cafe owners were glad to give him a free handout just to watch him eat. Kinkajous are related to, and as amusing as, a raccoon, and they can be just as mischievous.

We did no more collecting until we reached the Oaxaca-Puebla state line, where to my knowledge grew several interesting bulbous plants, including an unusual *Sprekelia* species that I had first collected in 1962. This tiny little *Sprekelia* was the most unusual and most distinctive of any that I have seen, and the first time I saw it, I was sure that it must be a *Habranthus* and continued to regard it as such until it flowered and revealed its identity in the spring of 1964. The narrow silvery green foliage is deeply channeled and the 10″ scape has dainty little red flowers of a very spidery appearance with segs less than ½″ wide. I had thought that this country would be too dry to support Sprekelias, since it seemed better suited for cactus, such as the giant Tetetzo that grew here. We stopped to dig some bulbs of this little *Sprekelia,* when much to my surprise, I found a second *Sprekelia* species growing along with these dwarfs! This second *Sprekelia* was a larger, more conventional kind with long, bright green foliage and much larger bulbs. I looked, but could find no evidence of intermediate hybrids so I assumed that indeed we had two distinct species. We also found a small white *Anthericum* species with reflexed cyclamen-like white afternoon blooming flowers and dug a few of these for our collection.

Nearing Izucar de Matamoros, Puebla, I stopped at K 210, by a hillside to dig bulbs of *Zephyranthes nelsonii* at the same spot that I had first dug them in 1962. These grew on a rocky ledge above the highway along with both *Milla biflora* and the night blooming *Milla* species. *Hymenocallis glauca* is abundant in this area, and I had first collected them here in 1954. Under cultivation, *Z. nelsonii* has proved to be one of the prettiest species, as the flowers are well formed and blessed with an unusually sweet fragrance for a Zephyranthes. The flowers are usually white, but occasionally they may have a touch of pink, and the texture is remarkable in that there is an ''icy'' sparkle overlaying the segs. We did no more collecting until we reached Mexico City as I had pretty well checked over the country on three previous trips. We stopped at University City to collect a few more bulbs of the large white *Habranthus* species that grows so abundantly in volcanic soil in the lava beds surrounding the University. I first collected this species in 1957 and have since made other collections from time to time. The bulbs can get huge . . . as large as hybrid *Amaryllis*, and the robust glaucous foliage can be easily mistaken for that of a *Sprekelia*. There are both large and small flowered forms of this species growing in this area, but except for the size of the flowers they seem to be identical. Under cultivation they seem to be unpredictable, sometimes growing vigorously, and sometimes refusing to grow at all. One can never be sure how they will perform from one year to the next.

We drove right on through Mexico City and headed homeward. For the first time during our trip, Chris got sick. This came as no surprise to me, since nearly every traveler visiting Mexico for the first time is apt to get it. What surprised me is that it took him two weeks to finally acquire the ''Curse of Montezuma''. We had almost decided that he would not get it. I had long since developed an immunity after my first trip in 1953. I made but one more collection after that, in the state of Queretaro, to collect a few *Milla biflora*, a pink *Zephyranthes*, and some yellow Anthericums. Crossing the border was uneventful. There was the usual inspection and fumigation of our plants and the three hour trip home from Laredo. All in all it was a very successful trip, and there is always the possibility that perhaps a few plants may prove to be new to science and welcome additions to cultivation.

## EDITOR'S MAIL BAG

The editor received a visit from Mr. and Mrs. W. W. Walton, 5318 Rivino Road, Riverside, Calif., on May 27, 1964.

Mr. W. Quinn Buck of the Los Angeles Arboretum, Arcadia, Calif., and Mr. Jack S. Romine, 6893 Charing Cross Road, Berkeley, Calif. 94705, visited with your editor. They were particularly interested in the tetraploid daylilies.

Dr. C. G. Rueppel, Casilla 370, Mendoza, Argentina, offers to exchange seeds of *Amaryllis,* and seeds of other unusual amaryllids, with members of the Society. Those interested should write directly to Dr. Rueppel.

The editor received a visit from Mrs. Frank McCown, Holtville, Calif., on Aug. 18, 1964. Mrs. McCown is interested in idids and amaryllids.

Mrs. M. S. Anthes, 123 Grandview St., Encinitas, Calif., who has imported some interesting new amaryllids, particularly from Argentina, visited the editor's garden on several occasions.

In August 1964, the editor enjoyed a visit from Mr. & Mrs. Clifford C. Smith, 5511 W. 116th St., Los Angeles, Calif. 90045, who brought a potted plant of *Zephyranthes grandiflora* Lindl., native to Mexico, (triploid sterile form) for identification. Mr. Smith had collected the original bulb in the wilderness area (Marble Mts.) of Northern California 12 years ago, but had not been able to have it identified, This plant had apparently been grown by some early settler in Northern California.

The members will be saddened to hear that Mr. C. Lloyd Burlingham, of Punta Gorda, Fla., a long standing member of the Society, died on Aug. 31, 1964, after a short illness.

Mr. & Mrs. E. R. Middelmann, of Honingklip Nurseries, ''Barosma'', Barmbeck Av., Newlands, Cape Town, South Africa, traveled in the United States from Nov. 1964 to Febr. 1965, showing their unusual and beautiful color slides which accompanied their lecture, ''Proteas and Ericas, unusual flowering shrubs from the Cape of Good Hope.''

Dr. Roujansky, Director, Etablissment Horticole, O. R. Du Grand-Tampon, B. P.: 31 Tampon, Isle de la Reunion, Ocean Indien, writes of his interest in *Amaryllis* and other amaryllids under date of November 1, 1964.

We have just learned (Nov. 16, 1964) that due to a heart attack, Mr. E. L. Brasol, and his family, have moved from their wonderful jungle farm into town. His many friends will be pleased to hear that he is now in good health. His address is: P. O. Box 1774, Daytona Beach, Fla. 32015.

The Ofuna Botanical Garden, No. 1018, Okamoto, Kamakura, Shi, Kanagawa-Ken, Japan, Dr. Motoo Shimizu, Director, has sent to the Editor pamphlets on the Garden, and the export of flowering plants from Kanagawa Prefecture. The plants listed do not include *Lycoris,* and these should be added. Hybrid *Amaryllis* are included.

Mr. C. W. Lander, 26 Cleveland Av., Milton Park, Salisbury, Rhodesia, writes under date of Nov. 11, 1964, that he is joining the ranks of *Amaryllis* breeders. We welcome him.

Mr. V. Roger Fesmire, 1170 South Xavier St., Denver, Colorado, the noted breeder of *Amaryllis,* visited with your Editor on December 7, 1964.

PLANT LIFE LIBRARY—continued from page 4.

THE PLANT KINGDOM, 2nd Edition, by H. C. Bold. Prentice-Hall, Englewood Cliffs, N. J. 1964. Pp. 118. Illus. Paper, $1.75; cloth, $3.95. Teachers and students will welcome this second edition of an outstanding text as part of a beginning course in biology. The subject matter is grouped under the headings—the unity and diversity of plants; the algae; bacteria; slime molds and fungi; mosses and liverworts; structure of vascular plants; seedless vascular plants—ferns; seed plants—gymnosperms, angiosperms; and summary. Highly recommended.

THIS VIEW OF LIFE—THE WORLD OF AN EVOLUTIONIST, by G. G. Simpson. Harcourt, Brace & World, Inc., 757 3rd Av., New York 17, N. Y. Pp. 308. $5.95. On the basis of a sound grounding in evolutionary biology, Professor Simpson has produced a brilliant exposition of his views on life. The subject is developed under the headings—approaches to evolution; evolution among the sciences; the problem of purpose; and evolution in the universe. This stimulating book is required reading for all biologists. Highly recommended.

WATER METABOLISM IN PLANTS, by Theodore Kozlowski. Harper & Row, 49 E. 33rd St., New York 16, N. Y. 1964. Pp. 227. Illus. $4.25. This stimulating new monograph on important aspects of water metabolism in plants at the cellular and whole-plant levels, by an outstanding authority, will be welcomed by teacher and student. The subject is developed under the headings—xerophytism and plant water balance; water relations of plant cells and tissues; absorption of water; water transport; loss of water; and effects of water deficits on plants. Highly recommended.

ERASMUS DARWIN—GRANDFATHER OF CHARLES DARWIN, by Desmond King-Hele. Chas. Scribner's Sons, 597 5th Av., New York 17, N. Y. 1963. Pp. 183. Illus. $3.95. This evaluation of the place of Erasmus Darwin (1731-1802) in literature and science is long overdue. Erasmus was among the most respected medical doctors of his time, a best-selling poet, and prolific inventor who also proposed scientific theories, including a theory of bioevolution. The author develops the evaluation under the headings—18th century medicine; life story; animal and vegetable; the theory of evolution; "The Botanic Garden"; "The Temple of Nature"; influence of the poems; inventions; and conclusions. Highly recommended.

GUIDE TO THE LITERATURE OF BOTANY, by B. D. Jackson. Facsimile of the 1881 Edition. Hafner Publ. Co., 31 E. 10th St., New York 3, N. Y. Publ. 1964. Pp. 626. $12.50. This facsimile reprint of a standard botanical reference book includes nearly 6,000 titles not given in Pritzel's "Thesaurus" (2nd ed. 1872-7). Following the historical introduction, the literature of botany is classified under bibliography; history; biography; indexes; encyclopedias; keys to other books; nomenclators; systems; pre-Linnean botany; introductory works; physiological and morphological works; descriptive botany; paleobotany; economic botany; emblematic works; practical botany; local works; local floras; botanical gardens; and serial publications. This is an indispensable reference work for all interested in phytology.

HENDERSON'S—A DICTIONARY OF BIOLOGICAL TERMS, 8th Edition, by J. H. Kenneth. D. Van Nostrand Co., 120 Alexander St., Princeton, N. J. 1963. Pp. 640. $12.50. This 8th edition of a standard reference book will be welcomed by all biologists. The work has been extensively revised, and new material has been added, so that over 16,000 biological terms are included. The pronunciation, derivation and definitions of terms is indicated. An attempt has been made to include terms used in American texts. There is a table of equivalents—weights, measures, etc., a list of abbreviations used, and a list of sound-symbols used in pronunciation. There are apparently few omissions, such as the lack of cross references between "corona" and "paracrolla". This reference work is indispensable to all biologists and is highly recommended.

PLANT LIFE LIBRARY—continued on page 118.

# 1. REGIONAL ACTIVITY AND EXHIBITIONS

## 1964 AMARYLLIS SHOWS

The Official Amaryllis Shows for the year 1964 began on April 4—5, and ended on May 2—3.

The Men's Amaryllis Club of New Orleans Show was held April 4—5. This was followed by the Coastal Bend Amaryllis Society Show on April 11—12, the Garden Circles Amaryllis Club of New Orleans 15th Show on April 11—12; and the Greater Houston Amaryllis Club Show also on April 12. The Valdosta Amaryllis Show was held on April 18—19; the Houston Amaryllis Society Amaryllis Show was held on April 19; the 12th Greater Gulf Amaryllis Show of the Amaryllis Society of Mobile was staged on April 25—26, and The Hattiesburg (Miss.) Amaryllis Society Show on May 2—3.

## OFFICIAL MEN'S AMARYLLIS CLUB OF NEW ORLEANS AMARYLLIS SHOW, 1964

Walter R. Latapie, *Show Standards Chairman,*
*3737 Elysian Fields Av., New Orleans, La. 70122*

The Men's Amaryllis Club of New Orleans held their 7th Annual Show on April 4th and 5th, 1964. Continuing the tradition of their six previous shows, the Club again scored a huge success. Registered attendance exceeded 500.

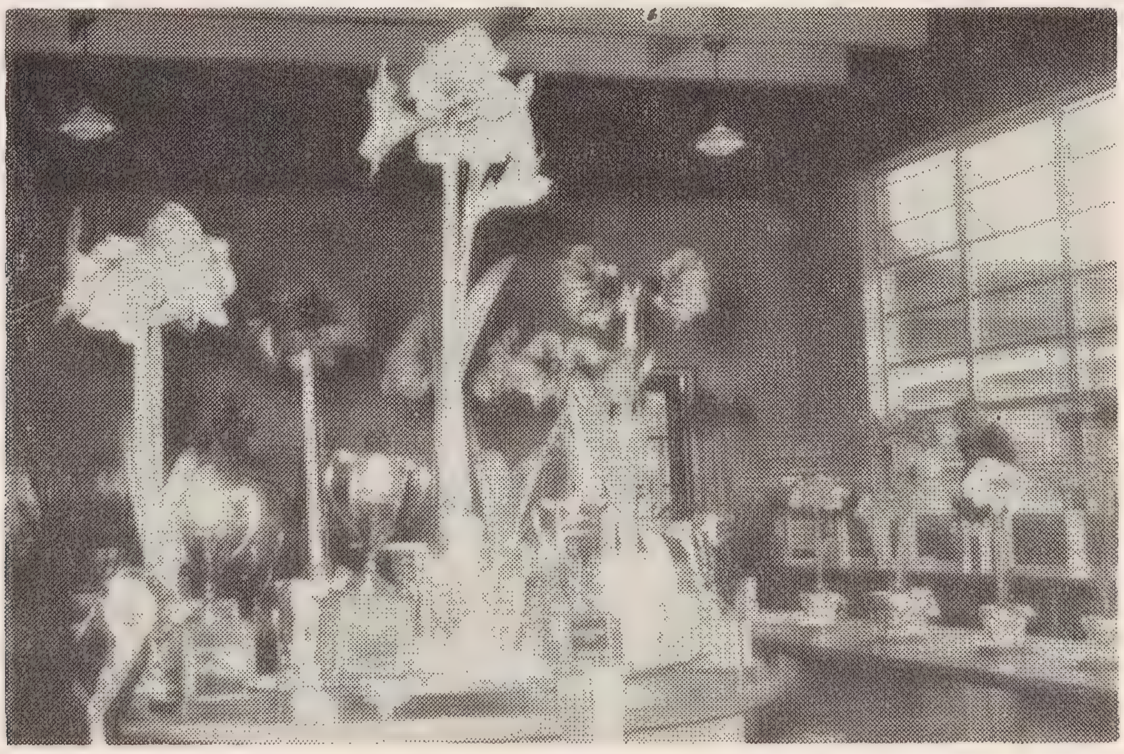

Fig. 3. Trophy table Men's Amaryllis Club Show, New Orleans, 1964.

Again, a number of out of town visitors also enjoyed the exhibits. From the cities within Louisiana we had guests from Baton Rouge, Prairieville, Hansville, Luling, Thibodaux, Raceland, Belle Chase, Bastrop, Shreveport, Covington, Destrehan, and Port Sulphur. From out of the state, amaryllis enthusiasts came from Mobile, Ala., Lothan, Ala., Gautier, Miss., and Biloxi, Miss.

Awards in the horticulture section were received by: N. J. Clements, tricolor winner in Dutch Hybrid class (Jessee Nursery award); Stephen P. Gasperecz, tricolor winner in American hybrid class (Newsham-Becnel award); Rodney F. Broussard, sweepstakes winner in Dutch hybrid class (Reuter Seed Co.); Rodney F. Broussard, president's trophy for most blue ribbons won by a member of the Men's Amaryllis Club (Men's Amaryllis Club award); Stephen P. Gasperecz, outstanding specimen of an American Seedling (Men's Amaryllis Club award); W. J. Perrin was silver cup award winner for runner-up for tricolor in Dutch hybrid class (Swetman challenge cup); Rodney F. Broussard, silver tray award winner for most blue ribbons in Dutch hybrid class (Swetman Amaryllis Garden trophy).

Awards of merit of the American Plant Life Society went to: E. M. Beckman, for Golden Triumphator; Mrs. A. J. Esteves, for Wyndham Hayward; W. J. Perrin, for Daintiness.

Preliminary Commendations were given to: E. F. Authement; Rodney F. Broussard; W. J. Perrin.

Mr. Frederic Schmitz, Assistant Professor of Horticulture, Plaquemines Parish Experimental Station, Diamond, La., (L.S.U. A and M College) again showed his colored slides and held discussions on *Amaryllis* during the afternoon of Sunday, April 5th.

James Mahan was Chairman of the Show, with Walter R. Latapie acting as Co-Chairman.

## OFFICIAL COASTAL BEND AMARYLLIS SOCIETY AMARYLLIS SHOW, 1964

MRS. CARL C. HENNY, *Vice-President*
*Corpus Christi, Texas*

The Coastal Bend Amaryllis Society conducted its annual show in conjunction with the Lola Forrester Flower Show held in the Exposition Hall, April 11th and 12th, 1964.

Mr. Henry E. Lemoine received the Ludwig Challenge Trophy for winning the greatest number of blue and red ribbons in the registered pot grown Leopoldii and Reginae Type amaryllis.

Mr. Lemoine's Bouquet *Amaryllis* scored the highest in his collection. He also won a silver trophy for the highest scoring registered *Amaryllis*, potted plant, exhibited in the Amaryllis section of the show, scoring 97 points.

Mr. Harvey Vogt received a silver trophy for his entry, Maria Goretti, a Ludwig variety cut scape which scored highest in the registered Cut Scape section, scoring 97 points.

The highest Award of Merit for Bulbs and a blue ribbon for his entry of Ludwig's Apple Blossom cut scape were won by Mr. Richard A. Blucher, a non-member, scoring 98 points.

The Awards of Merit, issued by the American Plant Life Society, were awarded to Mr. R. A. Blucher, Mr. H. E. Lemoine, Mrs. William Lorenzen, Mrs. Cecil Redford, Mr. Harvey Vogt and Mrs. Charles E. Weeks, each scoring 96 points.

The Awards of Preliminary Commendation were issued to: Mrs. L. A. Buckner, Mr. Ted Herring, Mrs. C. E. Horton, Mrs. R. A. Hornberger, Mrs. W. S. Liles and Mr. Dennis Flinn, for outstanding entries within the Amaryllis Exhibit, all—95 points.

Members of the Coastal Bend Amaryllis Society received 22 Blue Ribbons, 15 Red Ribbons and 7 Gold Ribbons for their entries, making a total of 44 ribbons received.

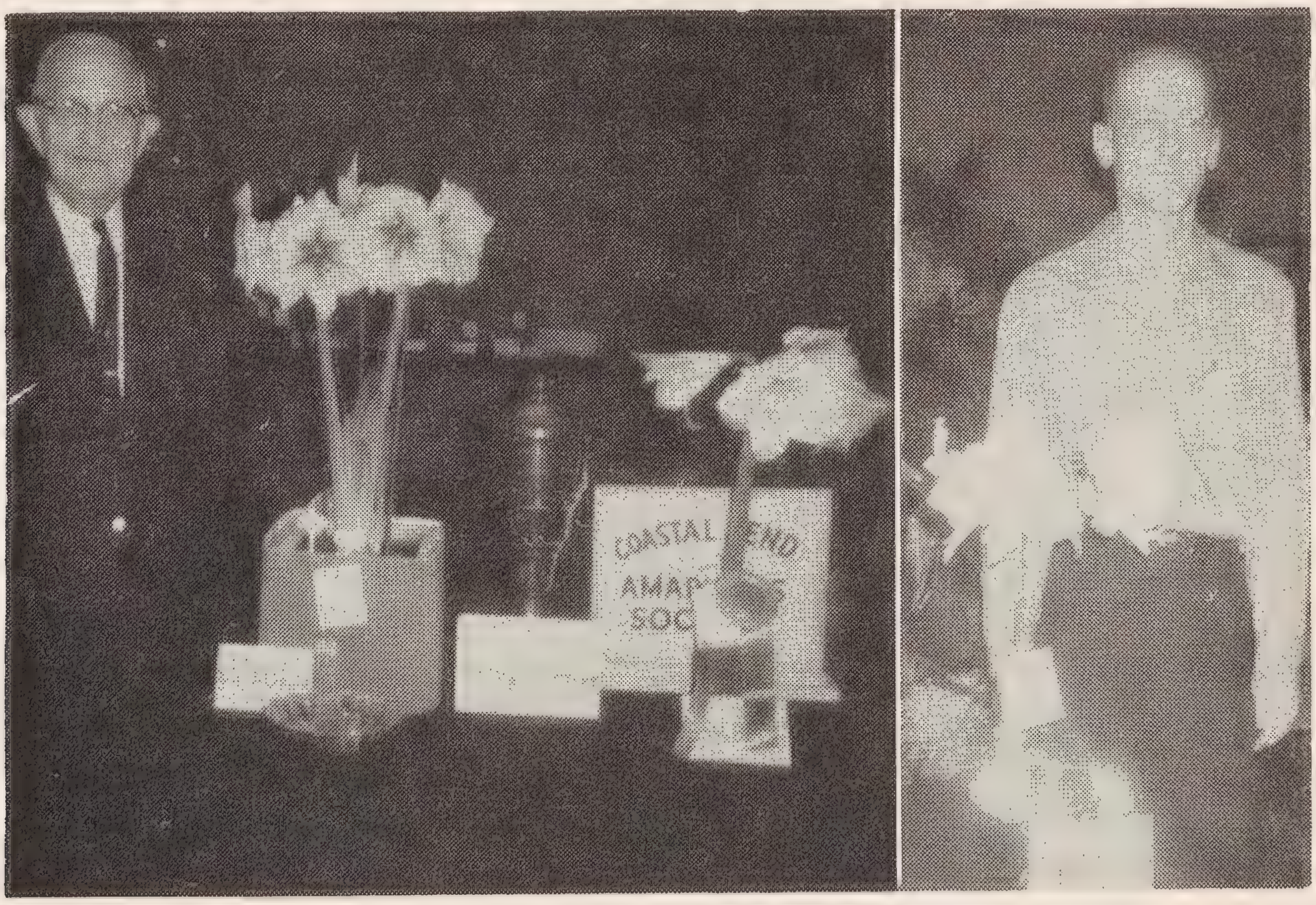

Fig. 4. Coastal Bend Amaryllis Society Show, Corpus Christi, Tex., 1964. *Left*, Mr. H. E. Lemoine, winner Ludwig Trophy with 'Bouquet' (Lud.). *Right*, Mr. Harry Vogt, winner Silver Trophy, with 'Marie Goretti'; best cut scape in Show.

Among the Ludwig registered and names *Amaryllis* entered were 'Happy Memory', 'Masterpiece', 'Picotee', 'Square Dance', 'Beautiful Lady', 'Candy Cane', 'Streaking Stripes', 'Goliath', 'Ludwig's It', 'Cardinal', 'Rockett', 'Home Decorator', 'Dutch Belle', 'Champion's Reward', 'Bouquet' and 'Apple Blossom'.

A total of 96 entries were made in the show, with 90 awards being given. Accredited American Amaryllis Society Judges for the show were Mrs. Jesse Haver, Mrs. R. H. Schmuck and Mrs. R. L. Morgan, all from Houston, Texas.

Despite the lack of much needed rain and cold and cloudy weather this year, our society display was considered one of the most interesting in the flower show.

# 15th OFFICIAL AMARYLLIS SHOW, NEW ORLEANS, 1964

MRS. JOHN KLEIN, JR., *Show Chairman,*
*2504 Mistletoe St., New Orleans, La. 70118*

The 15th Official Amaryllis Show in New Orleans, was sponsored by the Garden Circle Amaryllis Club. Affiliated with the American Amaryllis Society; The Federated Council of New Orleans Garden Clubs; Jefferson Council of Garden Clubs and the Louisiana State and National Federation of Garden Clubs, was held on Sat. April 11th and Sunday April 12th, 1964 at the Eleanor McMain Junior High School, 5712 So. Claiborne Avenue. 60 Garden Clubs participating in the Artistic Arrangements and Corsage Division.

Mrs. John Klein Jr. was Show Chairman; Vice Chairmen Mrs. A. R. Oddo and Mrs. A. J. Haydel.

The Horticulture exhibit was opened to the public. The Arrangements were judged by six accredited judges and the horticulture exhibit by nine Official Amaryllis Judges.

Award of Distinction and Silver Tray was given to Mrs. Oscar Paysee Jr. of the Pine Village Garden Club for her outstanding arrangement, titled Exotic. In the Corsage Division, Mrs. Robert Keller won the Blue Ribbon for her Formal Corsage for Odd and Fanciful, and Mrs. W. Prudhomme for the Informal Corsage ''Precice an Trim''.

The following awards were given: Mrs. W. J. Perrin won the Ludwig Challenge Cup for the best Ludwig Specimen 'Apple Blossom'. She also won the Reuter Seed Trophy, a beautiful Silver Tray for the outstanding Dutch Specimen in the Show 'Apple Blossom'. The Klein Award for the most Blue Ribbons in Dutch Horticulture was given to Mr. Milo C. Virgin. Sweepstake Ribbons for the most Blue Ribbons in American Horticulture to Mrs. Frank Ramos and Mrs. Harry St. John who tied.

Best Two Floret to Mrs. A. J. Haydel was a Silver Tray.

Best Three Floret to Mr. Rodney Broussard a Silver Tray. The New Orleans Public School Award to McDonogh No. 7 School for the Third Consecutive Year. Mrs. J. C. Zwicke Award of Merit Ribbon for the best Cut American Specimen. Award for the best single floret for Garden Circle Amaryllis Club Member only was given to Mrs. M. G. Authement.

The awards of merit from the American Amaryllis Society went to Mrs. A. J. Haydel, Mrs. W. J. Perrin, Mrs. M. G. Authement, Mr. Milo C. Virgin, and Mrs. John Klein Jr.

P. C. Awards were given to Mrs. John Klein Jr., Best Seedling (Dutch); Mr. Milo C. Virgin, American Seedling; Mrs. F. L. Ramos, American; Mrs. J. C. Zwiche, American; Mrs. A. Guizirix, American; Mrs. A. Autry, American.

Blue Ribbon winners in Horticulture were Mrs. A. J. Haydel, Mrs. John Klein Jr., Mrs. W. J. Perrin, Mrs. M. G. Authement, Mrs. William Morgan, Mr. Milo C. Virgin, Mr. Rodney Broussard, Mrs. J. C. Zwiche, Mrs. A. P. Guizerix, Mrs. F. L. Ramos, Mrs. Ed. Landry, Mrs. A. Autry and Mrs. Harry St. John.

There were Six Invitational Arrangements Displayed on Pedestals by non-competitive Guest Artist.

There were 196 entries in Horticulture and over 500 people attended the Show including a number of visitors from out of State such as Alabama, Mississippi and Texas.

The 15th Official Amaryllis Show was displayed by division 1 to 9 as per Revised Show Schedule for Official Amaryllis Show in 1961 Amaryllis Year Book.

## OFFICIAL GREATER HOUSTON AMARYLLIS CLUB SHOW, 1964

Mrs. Sally Fox

Breathtaking, beautifully colored amaryllis blossoms greeted an overflow crowd Sunday, April 12, 1964, at the Garden Center when the Greater Houston Amaryllis Club proudly presented their annual flower show with the theme ''Amaryllis Around The World''. Mrs. Walter D. Wells, Sr. was general chairman, capably assisted by all members to stage an outstanding show.

Arrangements to represent many countries where amaryllis are native were shown by the members. The staging committee carried out the theme of the show with a mammoth ten foot ''world'', which drew favorable attention.

Competition was keen for the beautiful trophies. The highest award, along with an official merit of award from the American Amaryllis Society, was won by Mrs. Walter D. Wells, Sr. for Little Diamond, a blend of pink and white. This well-known grower also was awarded the Ludwig Challenge Cup for a miniature type Firefly, as well as a trophy for the best Dutch collection. Other winners were: For second high in named and registered Dutch specimen, and an official award of merit from the American Amaryllis Society, Mrs. W. S. Wheeler. For best named and registered Dutch cut specimen, Mrs. R. A. Fawcett. For best American Hybrid specimen, Mrs. R. A. Fawcett. For highest commended Dutch seedling, Mrs. C. R. Frampton. For best new introduction of Dutch Hybrids, Mrs. Charles H. Pease. Mr. W. S. Wheeler was awarded a silver tray for the best blossom in the invitional class.

A highlight of the show was the educational booth which was most unusual and truly educational since it showed the various stages of breeding a native (or wild) *Amaryllis* grown in its original natural state in the foreign countries with various pollen parents to develop the good growing habits in both, thereby producing a variety that would be appealing.

Guests were asked to vote for their favorite blossom in the show and a dark red blossom ''Queen Superiora'', was the selection by a

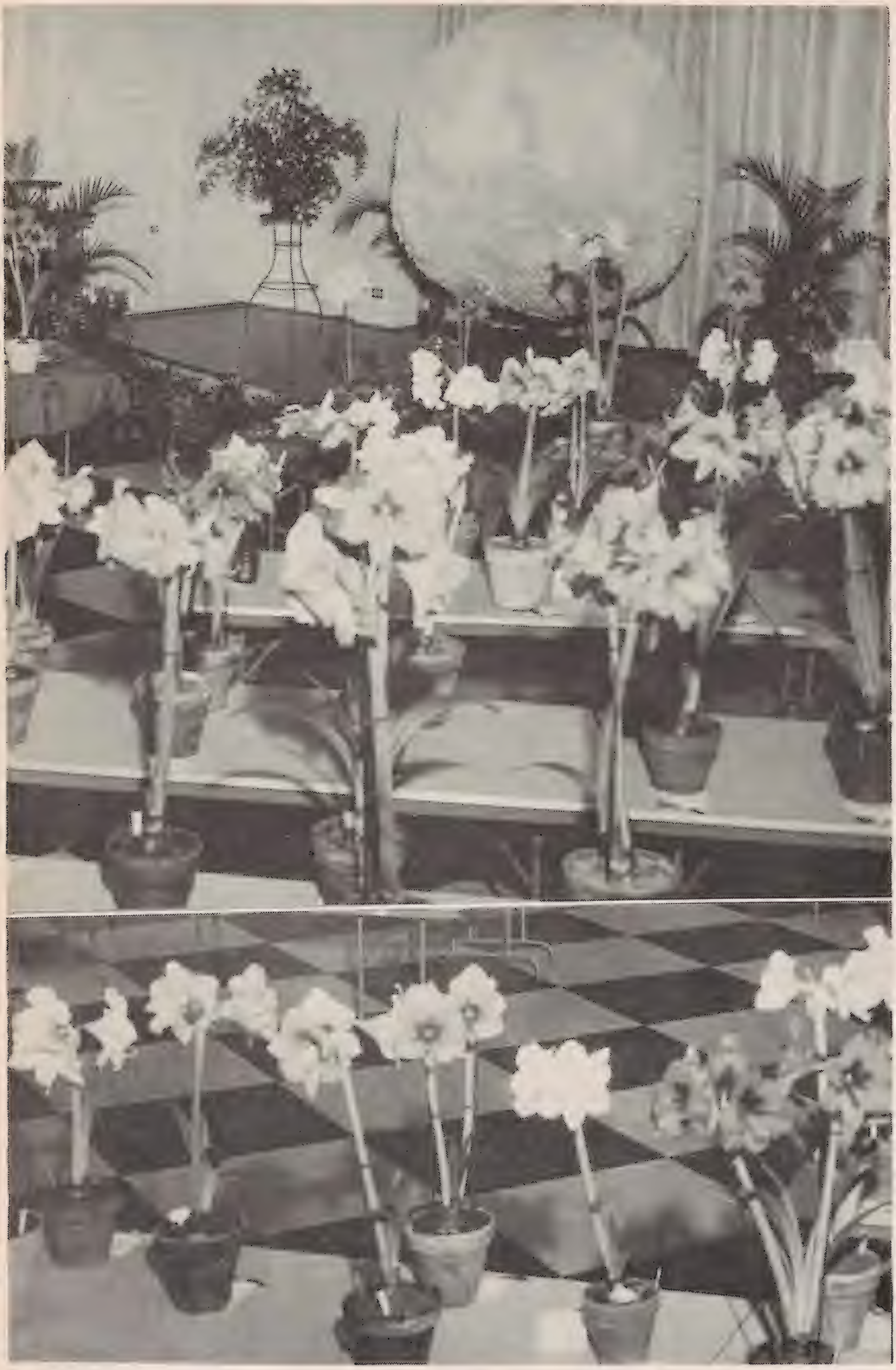

Fig. 5. Greater Houston Amaryllis Club Show, 1964. Part of the exhibits.

great margin. Next was ''Floriade'', a blend of pink and white and ''Golden Triumphator'', a salmon blend, third.

A refreshment table where the visitors could enjoy a cup of punch and cookies was added to the 1964 Show. This brought a lot of favorable comment.

## OFFICIAL VALDOSTA AMARYLLIS SHOW, 1964

GUY RICE

The Official Valdosta Amaryllis Show was held April 18—19, 1964, at the Garden Center Auditorium. It was sponsored by the Valdosta Men's Garden Club and the American Amaryllis Society.

Mrs. Hyta Mederer was sweepstakes winner; and Mrs. C. H. Mock had the most outstanding entry in Horticulture with 'Floriade'. Top honors were awarded to Mr. Hulyn Smith for a potted plant of 'Rembrandt'; to Mr. James Wheeler, for a cut scape of 'Apple Blossom'; to Mr. Guy Rice for seedlings in hybridizers class.

## OFFICIAL HOUSTON AMARYLLIS SOCIETY SHOW, 1964

MRS. A. C. PICKARD, *Official Show Standards Chairman,*
MRS. JOE E. CRAFT, *Flower Show Chairman*

''Amaryllis, our promise of Spring'' was the theme of the Houston Amaryllis Society's Official Show, held in the Houston Garden Center, April 19, 1964.

To a flower lover, gardener and flower arranger the Society's show has grown to be the most popular event of the Spring season.

The classification of entries included the named and unnamed species from Division 1 through Division 8 with exception of Division 2, long trumpet. Unclassified (non registered) were grouped by countries of origin.

Exhibits in possession less than one year were classified in a separate section from exhibits grown more than one year. However, the two separate sections were competitive, as it requires less effort to bring into bloom the newly purchased bulb.

Potted plants were placed in classes by number of scapes per plant. Collections, minimum 5 specimens, named and registered Dutch (all one color), Dutch named and registered, all different, all garden grown added another point of interest.

Under the Amaryllid section the Clivias were proudly displayed with their lovely umbels of salmon flowers with yellow throats.

The educational section showing methods of vegetative and asexual propagation always seems to appeal to the public.

Most interesting additions to the show were the two six foot tables of Dutch A. seedlings from the Pickard's Amaryllis Gardens, hybridized by Mrs. A. C. Pickard. All were Leopoldii type in colors from dark red through all shades of pink. Another six foot table held many

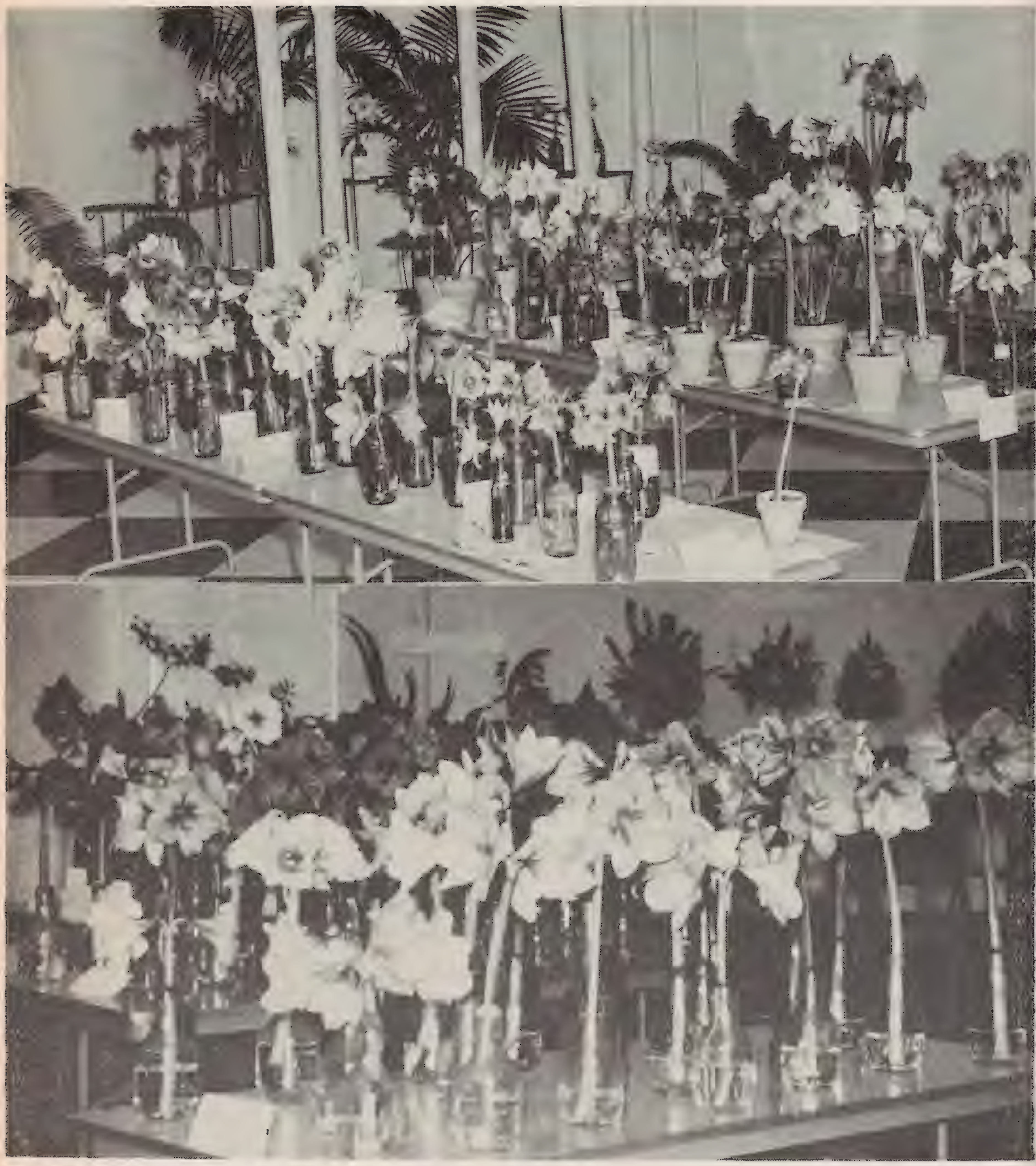

Fig. 6. Houston Amaryllis Society Show, 1964. Part of the exhibits.

outstanding seedlings grown by other members of the H.A.S. It was difficult to select favorites from so many new arrivals.

The horticulture section would not be complete without mention of high praise for the "Junior Amaryllis Society" exhibits of cut and potted Dutch specimens, including their educational table demonstration of seed planting to seedling, and named clone.

Invitational classes in horticulture and artistic sections displayed the growing interest in the Amaryllis world.

The Artistic section was executed with perfection, featuring Amaryllis in various arrangements.

A sponsored art exhibit by one of Houston's most popular masters of art was acclaimed for its outstanding beauty.

The H.A.S. show was a standard competitive official show. Horticulture was judged by official Amaryllis judges. There were 7 classes in artistic arrangements including the invitational class for Jr. judges and a class for national flower show judges. Mrs. W. L. Offenbacher won the tri-color in the Artistic section.

In the Horticulture section the following received the highest A.M. and H.A.S. Trophies; 'Boquet' (Lud.) A.M. & H.A.S. Trophy—Mrs. Carey Z. Brown; 'Golden Triumphator' (Warm.) A.M. & H.A.S. Trophy—Mrs. Joe E. Craft; 'Home Decorator' (Lud.) A.M. & Ludwig Cup—Mrs. M. E. Shelton; 'Pamela' (Lud.) A.M. & H.A.S. Trophy—Mrs. E. O. Griener; Breeders class: 'Dutch Seedling' P.C. & H.A.S. Trophy—Mrs. A. C. Pickard; 'Dutch Collection' H.A.S. Trophy—Mrs. A. C. Pickard; 'Apple Blossom' (Lud.) Houston Junior A.S. Founders Trophy—Robert Guenther.

The Houston Amaryllis Society is a working group and we renew our acquaintance each Spring with old favorites with the same joyous expectations that we greet the new arrivals.

## 12th OFFICIAL GREATER GULF AMARYLLIS SHOW, 1964

Miss Mildred Laughlin, *Secretary*
*701 Dauphin Isle Parkway, Mobile, Alabama*

The Amaryllis Society of Mobile staged its 12th Annual Greater Gulf Amaryllis Show, April 25 and 26, 1964, in Mobile, Alabama at the Murphy High School Cafeteria. Colonel Robert Pollack was Show Chairman and W. A. McCollum, Russell Ludlow and J. C. McRae acted as his Co-Chairmen.

Theme of the Show was AMARYLLIS UNDER FIVE FLAGS, with the theme being developed in the General Show decorations and the Artistic Arrangements.

The focal point of interest upon entering the Show was a large flagstaff containing the five flags side by side. Centered and in front of the flags was a small cannon. The display being enclosed with a small white picket fence which was flanked by *Amaryllis.*

Eighteen accredited judges from Hattiesburg, Mississippi, Pensacola, Florida and Biloxi, Mississippi judged the show. Award winners were:

Col. Robert Pollock, Sterling Silver Paul Revere Bowl for winning the most blue ribbons in show, including Horticultural and Artistic Arrangement Division; Silver Chased Tray with handles as winner of the most blue ribbons in horticultural division; Large Silver Tray with handles awarded for winner of the most blue ribbons in the combined Dutch Hybrid Potted and Cut Amaryllis Divisions; Silver Tray with handles as winner of the Most Blue Ribbons in the Dutch Hybrid Potted Amaryllis Division; Sterling Silver Cup for the Most Blue Ribbons in Dutch Named Varieties; Silver Cup for the Most Outstanding Hobby Collection of Amaryllis; Silver Bowl for the Most Blue Ribbons in unnamed Potted Seedlings; and Silver Bowl for the Most Blue Ribbons in the Single Bloom Named Division.

Mrs. J. C. McRae, Sterling Silver Vase for the Most Blue Ribbons in Artistic Arrangement Division; and The Inez Scheurmann Invitation Trophy with the entry for the Rose Club in the Invitational Class for Garden Clubs.

Miss Darby Hickson, Silver Trophy for Best Painting of Amaryllis (in Junior Division), and Silver Trophy for the Junior with the most blue ribbons.

C. E. Tagert, Sr., Silver trophy for Most Outstanding Horticultural Cut Specimen of Dutch Amaryllis in Show; Silver tray with handles for the Most Blue Ribbons in Dutch Hybrid Cut Amaryllis.

Wilmer Smith, Silver Bowl for the Most Blue Ribbons in the unnamed Cut Seedlings; Silver Bowl for the Most Blue Ribbons in the Single Bloom unnamed Division.

Mrs. Robert Waterhouse, Sterling Silver Sandwich Tray awarded for the Most Outstanding Horticultural Potted Bulb Specimen of Dutch Amaryllis in Show.

Mrs. R. E. Chason, Silver Trophy for the Most Outstanding Horticultural Potted Bulb Specimen of Amaryican Hybrid Amaryllis in Show.

Mrs. T. W. Antoine, Silver Trophy for the Most Outstanding Artistic Arrangement of Amaryllis in Show.

Miss Virginia Sherwood, Silver Trophy for the Best Painting of Amaryllis.

Mr. Jeff Brown, Silver Trophy for the Most Outstanding Horticultural Cut Specimen of American Hybrid Amaryllis in Show.

Mr. W. A. McCollum was given a Special Award Ribbon on his Hobby Display.

Col. Robert Pollack acted as Master of Ceremonies for the occasion. The Awards and Trophies were given by Mrs. A. B. Palmer, Chairman of that Committee, with the assistance of the President, Mr. Wilmer R. Smith.

# 4th OFFICIAL HATTIESBURG AMARYLLIS SOCIETY SHOW, 1964

MRS. SAM FORBERT, *1910 Evergreen Lane, Hattiesburg, Miss.*

The 4th Official Hattiesburg Amaryllis Society Show was held May 2—3, 1964 at the Garden Center. Several hundred enthusiastic Amaryllis fanciers came to view the outstanding array of blooms. The Show theme ''Creating Beauty'' was inspirational and tended to guide creative minds and hands in action. Friendly rivalry existed among members in both Horticulture and Artistic Design divisions of the Show. This resulted in the best Show up to the present.

This is to be expected because for the past seven years members have been growing Amaryllis from seeds, and these crosses of Dutch and American clones, are now coming to maturity and the flowers are coming into the Show. Wonderful new colors and forms are being produced and in due time when proved meritorious, will be registered and named. Hundreds of named clones are being planted each year, both in pots and outdoors.

Mrs. Charlie Bell's 'Heaven Sent' (Ludwig) was voted the most beautiful clone in the Show by an overwhelming majority vote of the visitors to the Show. 'Cardinal', 'Beautiful Lady', 'Streaking Stripes' and 'Happy Memory' each received a large vote also.

The Official Amaryllis Judges for the Horticultural Division were: Mr. and Mrs. J. A. Brown, Mr. W. C. Strain, Mr. W. R. Smith, Mr. W. A. McCollum and Mrs. A. B. Palmer, all of Mobile, Ala. The Artistic Design Judges were: Mrs. R. E. Goodwin, Mrs. S. D. Case, and Mrs. John B. Guenther, nationally accredited Flower Show Judges of Jackson, Miss. They judged thirty designs in six classes including both Free-Form-Interpretive and Geometric. There are fifteen nationally accredited Flower Show Judges in our Society which perhaps accounts for the expert workmanship in the designs displayed.

Winners of the Silver Awards were Mrs. Charlie Bell, Sweepstakes, with sixteen blue ribbons, captured the Swetman Traveling Trophy (Swetman Amaryllis Nursery, Gautier, Miss.).

Mrs. Charlie Bell, Best unnamed seedling, an outstanding red from Ludwig. Mrs. O. F. Coursey, Award of Merit for 'Zenith'. Mrs. John D. Askew, for a cut scape of 'Apple Blossom'. Mrs. Sam Forbert won in both cut scape and potted American hybrids. Miss Lucile Parker, exhibited the best painting of an Amaryllis in the Show.

Mrs. Paul Bailey received the tri-color award for a crescent design. Mrs. B. M. Lewis, received an Award of Distinction for a Free-Form Interpretive design. Mr. Robert D. Goedert, Amaryllis Bulb Dealer, of Jacksonville, Florida, donated the bulbs for the prizes.

Official American Amaryllis Society Awards of Merit were given to: Mrs. Charlie Bell, for 'Invincible', 'Cardinal', 'Streaking Stripes' and a Ludwig seedling; Mrs. O. F. Conway, for 'Zenith'; and Mrs. J. W. Snowden for 'Beautiful Lady'.

Preliminary Commendations from the American Amaryllis Society were awarded to Mrs. Sam Forbert for a cut scape of a seedling (Dutch-American cross), cut specimen (American seedling), a potted American seedling; Mrs. Charlie Bell, for a seedling raised from 'Apple Blossom'; Mrs. Jhnonie Jackson, for an American seedling; and Mrs. Charlie Bell, for a seedling grown from Ludwig stock.

## GREATER HOUSTON AMARYLLIS JUDGES COUNCIL

The fast growing Gulf Coast area, where plant life enjoys abundaut growth and where weather conditions are favorable for growing amaryllids, which have become more and more popular, has been lagging in sufficient accredited amaryllis judges to assist at the many shows each Spring. Realizing this, two well known Houston growers, who are accredited judges, conducted classes for members of The Greater Houston Amaryllis Club: Mrs. Walter D. Wells, Sr. in Horticulture and Mrs. W. S. Wheeler in flower arranging. The classes and examination were held in the home of Mrs. Wells at no cost to the members. As a result the area now has six additional accredited amaryllis judges, all members of The Greater Houston Amaryllis Judges Council, which was organized in January, 1964.

The Greater Houston Amaryllis Judges Council held monthly meetings during the blossoming period of the amaryllids, which will be their future policy. This Council has limited its membership to authorized amaryllis judges who must be active growers of varied types of amaryllids, with emphasis on each member growing some species.

The purpose of the Council is primarily to keep up with new rules on judging, as well as new trends in amaryllis and results of experiments of the various hybridizers.

The present officers are: Mrs. W. S. Wheeler, President, Mrs. Walter D. Wells, Sr., Vice President, and Mrs. Sally Fox, Secretary-Treasurer.

## THE SOUTHERN CALIFORNIA HEMEROCALLIS AND AMARYLLIS SOCIETY FOUNDED

This Society was founded in 1964 and will hold its first Amaryllis Show on April 24—25, 1965. Those interested in joining and/or exhibiting at the show should write to Mrs. Dorothy Rose, Secretary, 10300 Rosewood Av., South Gate, Calif.

## AMARYLLIS JUDGES CERTIFICATES

Since the last report in the 1964 Amaryllis Year Book (page 31), the following named Amaryllis Judges Certificates have been issued by the American Amaryllis Society:

134. Mrs. Earle W. Purser, 1523 Milford, Houston, Tex. 77006 (Horticulture only).
135. Mrs. K. C. Poulsen, P. O. Box 337, Lake Jackson, Tex. 77566 (Horticulture only).
136. Mrs. Esther Cash, 1101 E. Cedar, Angleton, Tex. (Horticulture only).
137. Mrs. L. E. Morgan, 1220 Chevy Chase Drive, Angleton, Tex. (Horticulture only).
138. Mrs. Thomas S. Behr, 5345 Windswept Lane, Houston, Tex. 77027 (Horticulture only).
139. Mrs. E. E. Koon, 1147 Panama, Houston, Tex. (Horticulture only).
140. Mrs. George Harris, 316 E. Bernard St., Clute, Tex. (Horticulture only).
141. Mr. Carey F. Brown, 9328 Leto Road, Houston 55, Tex. (Horticulture only).
142. Mrs. Lucy D. Wilkinson, 1008 Morningside Dr., Angleton, Tex. (Horticulture only).
143. Mr. Santo N. Cuchinotto, 2338 Independence St., New Orleans, La. 70117 (Horticulture only).
144. Mr. Barry W. Clark, 2735 Lavender St., New Orleans, La. (Horticulture only).
145. Mr. James E. Mahan, 3028 Palmyra St., New Orleans, La. (Horticulture only).
146. Mrs. Tracy T. Word, 3219 Fairhope St., Houston, Tex. 77025 (Horticulture only).
147. Mrs. A. F. Segatske, 2611 Oaks Drive, Pasadena, Tex. 77502 (Horticulture only).
148. Mrs. V. V. Hubby, 716 Heron Lane, Pasadena, Tex. 77502 (Horticulture only).
149. Mr. Tracy T. Word, 3219 Fairhope St., Houston, Tex. 77025 (Horticulture only).

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## AMARYLLIS REGISTRATION—continued from page 100

*Registered by G. C. Van Waveren & Sons, Heemstede, Holland*:

Reg. No. A-827, 'Berenice', very dark velvet red.
Reg. No. A-828, 'Daphne', brick red.
Reg. No. A-829, 'Durango', clear orange.
Reg. No. A-830, 'Fortuna', salmon with dark throat.
Reg. No. A-831, 'Hecuba', orange.
Reg. No. A-832, 'Odin', salmon pink.
Reg. No. A-833, 'Orion,' rose with white.

CONTROLLING MEALYBUGS—continued from page 152.

and meanwhile, the mealybugs are gone. It is my understanding that this material has both a systemic and contact effect in controlling insects.

The folder accompanying my bottle of Cygon 2E did not list any amaryllids at all, but for "Poinsettias and Outdoor Plants" it recommended a spray of 2 teaspoonfuls of Cygon 2E to the gallon of water, for control of mealybugs, Mites, white flies and aphids. I have simply used that strength, both as a spray and for immersing entire pots of growing bulbs. If there is any damage to the plants, I haven't noticed it.

This sounds like a patent medicine commercial or testimonial. I have no interest whatever in the manufacture or sale of this material, but am so grateful for it's killing the mealybugs on my plants that I'm glad to spread the news.

# CONTROL OF AMARYLLIS LEAF TROUBLE IN AUSTRALIA

C. A. Campbell, *New South Wales*

In the past I have had trouble with black and reddish-brown spots on *Amaryllis* leaves. [This is apparently the red leaf spot of *Amaryllis.* —Editor] I tried many kinds of sprays for fungi and insects obtainable on the market over the years, but without success. Recently I tried the commercial product, "Phenyle" on the plants with the spotting, using it at the rate of 2½ tablespoons of the product to one gallon of water. Before application, I cut away all of the affected leaves; "Phenyle" was sprayed on the plants two times a week. At the end of two weeks, the young leaves appeared normal without any spotting. On the basis of this experience, I spray all of my *Amaryllis* once each week with "Phenyle", and the leaves are now a beautiful green color. It may be that others having similar trouble would like to try this method of control for spotting of *Amaryllis* leaves.

*59 Gannons Road,*
*Caringbah, New South Wales.*

(Editorial note: It is hoped that Mr. Campbell will publish a note about the composition of "Phenyle" so that we may obtain an idea of what the active substance is which is effective in controlling red leaf spot in *Amaryllis.*)

# 2. LINEAGICS

[BIOEVOLUTION, DESCRIPTION, DETERMINING RELATIONSHIPS, GROUPING INTO LINEAGES]

## FOUR NEW BOLIVIAN **AMARYLLIS** SPECIES

MARTIN CARDENAS

### **Amaryllis umabisana** Cardenas, **sp. nov.**

(Macropodastrum) Bulbus ovoideus, tegumentum nigriscentibus obtectus, 6-7 cm long. 6 cm crassus. Foliis erectis, 30-35 cm long., 1.5-2 cm latis glaucus. Scapo plusminusve 30 cm long., 1 cm crasso, parce compplanato, herba viridis. Umbella 2-3 flora. Bracteis spathaceis 7 cm long. albidis apice bruneis. Pedicellis 2-3 cm long., 5 mm crassis. Floribus 17 cm long. niveo albis, fragrantibus. Ovario diluto viride, 12 mm long. 5 mm crasso. Tubo 3.5 cm long, 5 mm crasso. Setepalsegmentis 10 cm long. 3 cm latis, lanceolatis, mucronatis, albis a basim viridiscentibus. Petepalsegmentis lanceolatis 10 cm long., 2.5 cm latis, margo undulatis, niveo albis, a basim viridibus. Staminibus 5-6 cm long. Filamentibus albis a basim viridibus. Antheris 6 mm long. flavis. Stylo 6 cm long. albo a basim viridis. Stigma trifida alba. Lobis stigmaticis 5 mm long. Paraperigonium diluto viridis.

Patria: Bolivia. Provincia Bilbao. Departamento Potosi, prope Umabisa 2,000 m.

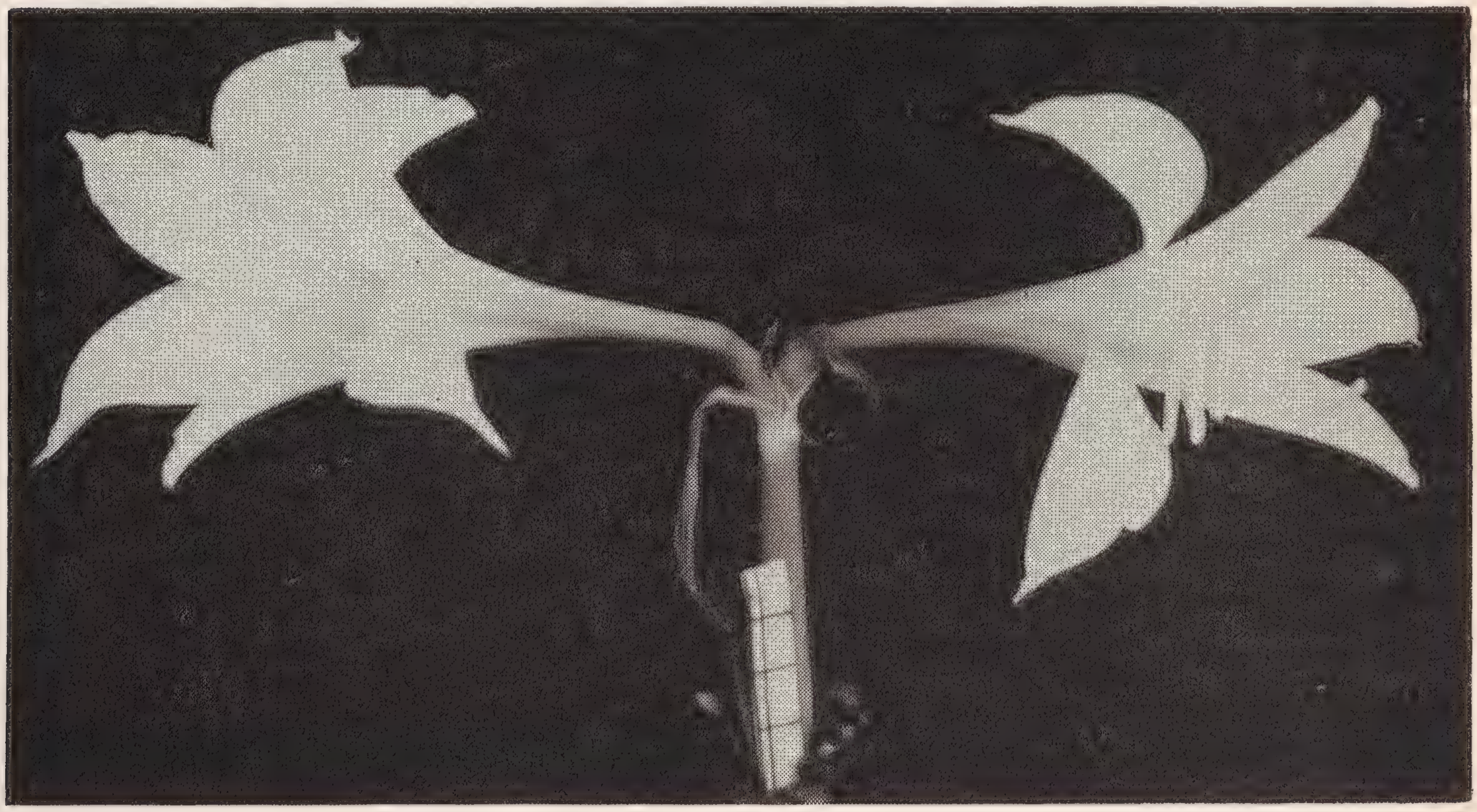

Fig. 7 *Amaryllis umabisana* Cardenas, *sp. nov.*

Bulb ovoid covered by almost black skin, 6-7 cm long, 6 cm thick. Leaves erect 30-35 cm long, 1.5-2 cm wide, gray green. Scape about 30 cm long 1 cm thick, fresh green somewhat flattened. Spathe valves 7 cm long whitish, brown tipped. Umbel 2-3 flowered. Pedicels 2-3 cm long, 5 mm thick. Flowers 17 cm long. 8 cm limb scented. Ovary 12 mm long, 5 mm thick light green. Tube 3.5 cm long, 5 mm thick above ovary, greenish white. Setepalsegs lanceolate 10 cm long 3 cm wide pure white, mucronate, greenish at the base. Petepalsegs lanceolate 10 cm long, 2.5

cm wide, curled at edges, snow white, deflexed, greenish at base. Stamens 5-6 cm long; filaments white, greenish at base; anthers 6 mm long, yellow. Style 6 cm long surpassing stamens, white, greenish at base. Stigma trifid with 5 mm long lobes. Paraperigone light green bearing few hairs.

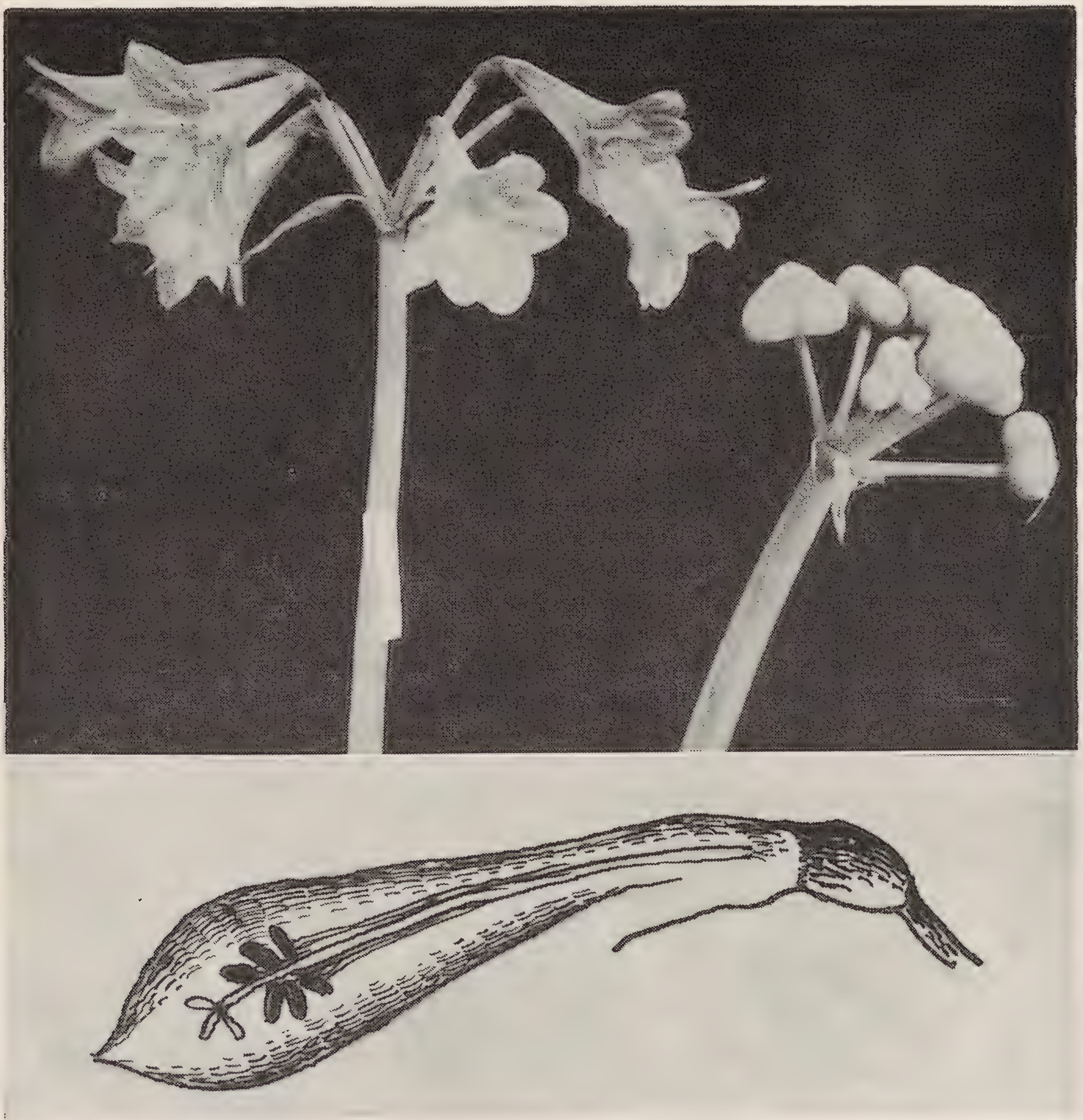

Fig. 8. *Amaryllis incachacana* Cardenas, *sp. nov.* (upper) flowering scape, and capsules; (lower) ovary, tepaltube, and tepalseg; also stamens and pistil (natural size).

Bolivia. Province Bilboa. Department of Cochabamba, near Umabisa, 2,000 m. On rocky cliffs among xerophytic bushes, November 1960, M. Cárdenas No. 6,100 (Holotype) in Herbarium Cardenasianum.

Obs.—This species recalls *A. chionedyantha* Cárd. by its long tube, and fragrant pure white flowers. Differs however by its very erect habit, its shorter flower parts and its xerophytic habitat which is unusual for *Amaryllis*. Another physiological character of this rare *Amaryllis* is that it does not flower even in Cochabamba at an elevation of only 2,500 m. and with similar dry air conditions.

### **Amaryllis incachacana** Cardenas, **sp. nov.**

Bulbo globoso 7 cm long. Foliis loratis 40 cm long. 3 cm latis herba viridis a basim purpureis. Scapo 50 cm long. cylindrico, parce compplanato superne glauco, inferne purpureo, 2,5 cm a basim crasso. Umbella 7-8 flora. Bracteis spathaceis 5-6 cm long lanceolatis bruneis. Pedicellis 3.5-5 cm long 3 mm crassis atro viridis. Floribus 7-8 cm long roseo lilacinus. Ovario 8-12 mm long. 6 mm crasso, trigono, atro viridis. Tubo 7 mm long. atro viridis. Setepalsegmentis lanceolato spathulatis 6-7 cm long. 2-2.5 cm latis, diluto roseis, linea media alba 3 mm lata instructis. Petepalsegmentis lanceolatis roseo lilacinis, linea media alba ostentis. Staminibus 4-5 cm long. Filamentibus albidis. Antheris 3 mm long. flavis. Stylo 6-7 cm long. Stigma trifida atro purpurea. Capsula triloculata 1-1.5 cm alta, 2.5-3 lata, atro-viridis.

Patria: Bolivia. Provincia Chapare. Departamento Cochabamba, prope Incachaca, 2,000 m.

Bulb globose about 7 cm in diameter covered by several brown tunic sheets. Leaves lorate 40 cm long, 3 cm wide, fresh green, purple at the base and unusually thick. Scape 50 cm long cylindric to slightly flattened at the base, glaucous above purplish below. Umbel 7-8 flowered. Spathe valves 5-6 cm long lanceolate, brownish. Pedicels 3.5-5 cm long at anthesis, dark green. Flowers 7-8 cm long, light purple to pink lilac. Ovary 8-12 mm long, trigone, 6 mm thick dark green. Tube 7 mm long dark green. Setepalsegments lanceolate to spathulate 7 cm long, 2.5 cm wide, light pink with a central white 3 mm wide line outside and red streaks inside. Petepalsegments lanceolate of same size and colour as setepalsegments. Stamens 4-5 cm long; filaments whitish; anthers only 3 mm long, yellow. Style 6-7 cm long. A very conspicous nectar cavity at the bottom of tube. Stigma trifid dark purple. Capsules similar to those of *A. belladonna,* L. 1-1.5 cm high, 2.5-3 cm broad, dark green with darker colour at the septal lines.

Bolivia. Province of Chapare. Department of Cochamba, near Incahaca, 2,000 m. No. 6102 (Holotype) in Herbarium Cardenasianum.

Obs.—This rare species of *Amaryllis* was obtained for study from a lady living at Cochabamba who said she obtained it from Incachaca. We have not collected it although we have visited Incachaca several times. It is like *A. mollevillquensis* Cárd. in the size and number of flowers. It is characterized by its thick leaves and the white middle line on the tepalsegs.

### **Amaryllis Pseudopardina** Cardenas, **sp. nov.**

Bulbus globosus 5-6 cm long. Foliis loratis 30-35 cm long., 2.5 cm latis, herba viridis. Scapo 10-16 cm long. parce compplanato, viridis. Umbella 2 flora. Braceteis spathaceis lanceolatis 7 cm long. flavidulis vel purpureis. Pedicellis 2-3 cm long., 3 mm crassis, viridis. Floribus actinomorphis, 11 cm long. Ovario trigono, 1 cm long. 5 mm crasso atro viride. Tubo brevis, 4 mm long. extus atro viridis. Setepalsegmentis 10 cm long. 2.5 cm latis, lanceolatis, mucronatis, exteriora cremea viridis, interiora alba viridiscente a marginem, sanguinea rubra a zonam media. Petepalsegmentis lanceolatis, 9.5 cm long., 3 cm latis, exteriora cremea viridis, interiora sanguinea rubra, cremea marginata. Paraperigonium viridiscentibus. Staminibus 7-9 cm long. inferne diluto viridibus, superne albis. Antheris 3-5 mm long. flavis. Stylo stamina superans 9-10.5 cm long. inferne temperato viridis, superne atropurpureo. Stigma parva trilobata, purpurea lila marginata. Capsula trilocularis, 3 cm. long., 3 cm. crassa atro viridis. Semina membranacei alata atro brunea 18 mm. long.

Patria: Bolivia. Provincia Chapare. Departamento Cochabamba. Yungas de Corani, 1,500 m.

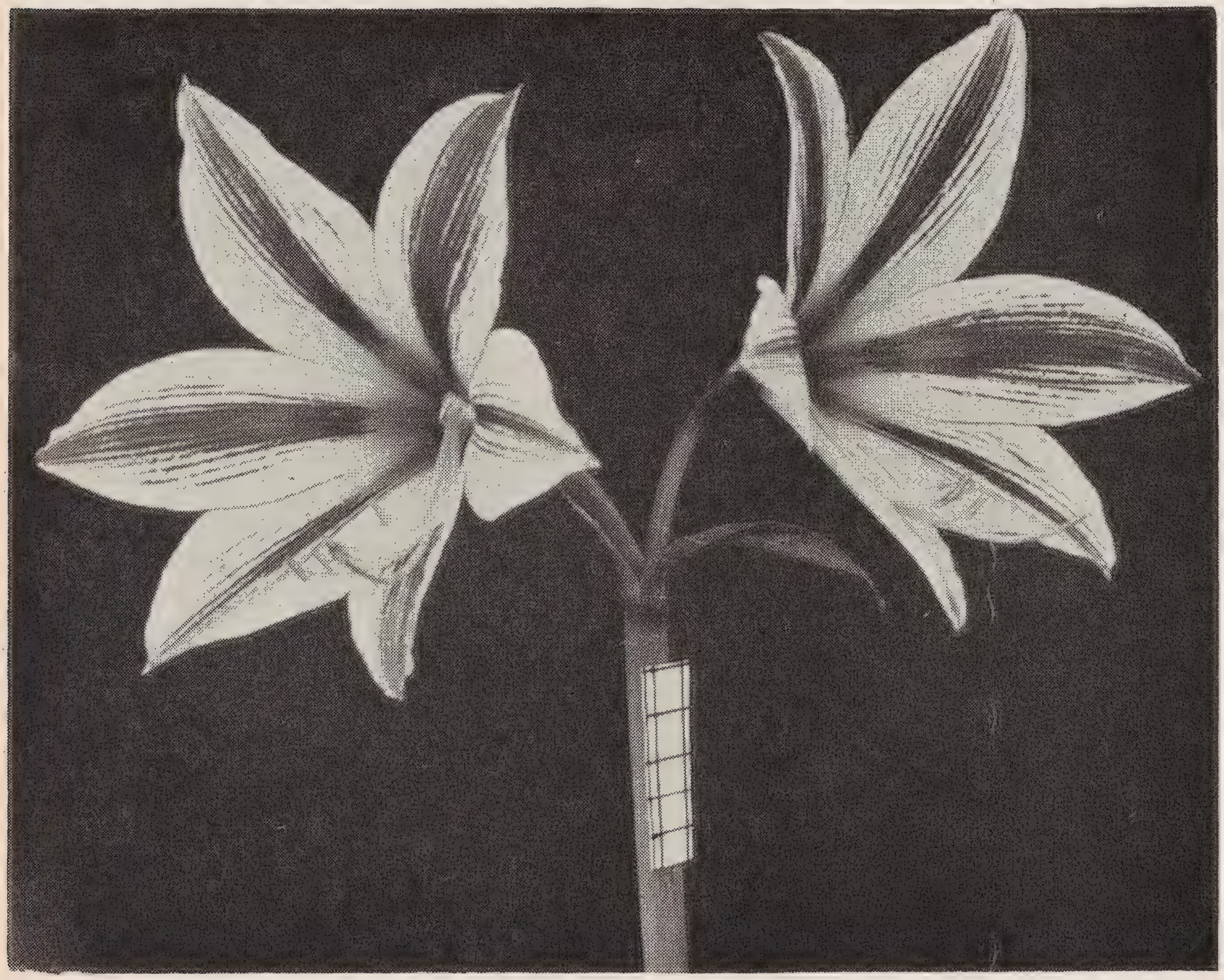

Fig. 9. *Amaryllis pseudopardina* Cardenas, *sp. nov.;* flower scape.

Bulb globose 5-6 cm long. Leaves lorate 30-35 cm long, 2.5 cm wide, fresh green. Scape 10-16 cm long slightly flattened, 8-11 mm thick, dark green, purple flushed. Umbel quite always 2 flowered. Spathe bracts lanceolate 7 cm long, yellowish purple. Pedicels 2-3 cm long, 3 mm thick, fresh green. Flowers regularly actinomorphic,, 11 cm long, 10 cm across limb, not completely opened. Ovary 3 ribbed, 1 cm long 5-6 mm thick, dark green. Tube very short, 3-4 mm long, dark green, Setepalsegments lanceolate acute to mucronate 10 cm long, 2.5 to 3 cm wide, cream greenish outside, white greenish with a solid blood red central band inside. Petepalsegments lanceolate. mucronate, 9.5 cm long, 3 cm wide of the same colour as are the setepalsegments. The lower petepalsegments narrower, only 2.5 wide. Paraperigone light green with 5 mm long hairs closing entirely the tubular throat. Stamens 7-9 cm long light green below, whitish above; anthers 3-5 mm long, yellow. Style longer than the stamens 9-10.5 cm long, light green below, dark purple above and again white greenish at the very base of stigma. Stigma slightly trilobate, purple bearing a lilac bordering line around the lobes.

Capsule triocular, 3 cm. long, 3 cm. in diam., dark green with darker or blackish borders. Seeds flat, D-shaped, membranaceus, dark brown 18 mm. long.

Bolivia. Province of Chapare. Department of Cochabamba. Yungas of Corani, 1,500 m. February 1959. M. Cárdenas, No. 6,094 (Holotype) in Herbarium Cardenasianum.

Obs.—This handsome species is reminescent of *A. pardina* Hook f. in the color of the tepalsegs but differs by its not deflexed flower segments and the wide rare solid blood red band at the middle of tepalsegs which is continued by red streaks towards its borders. The short scape is always 2-flowered.

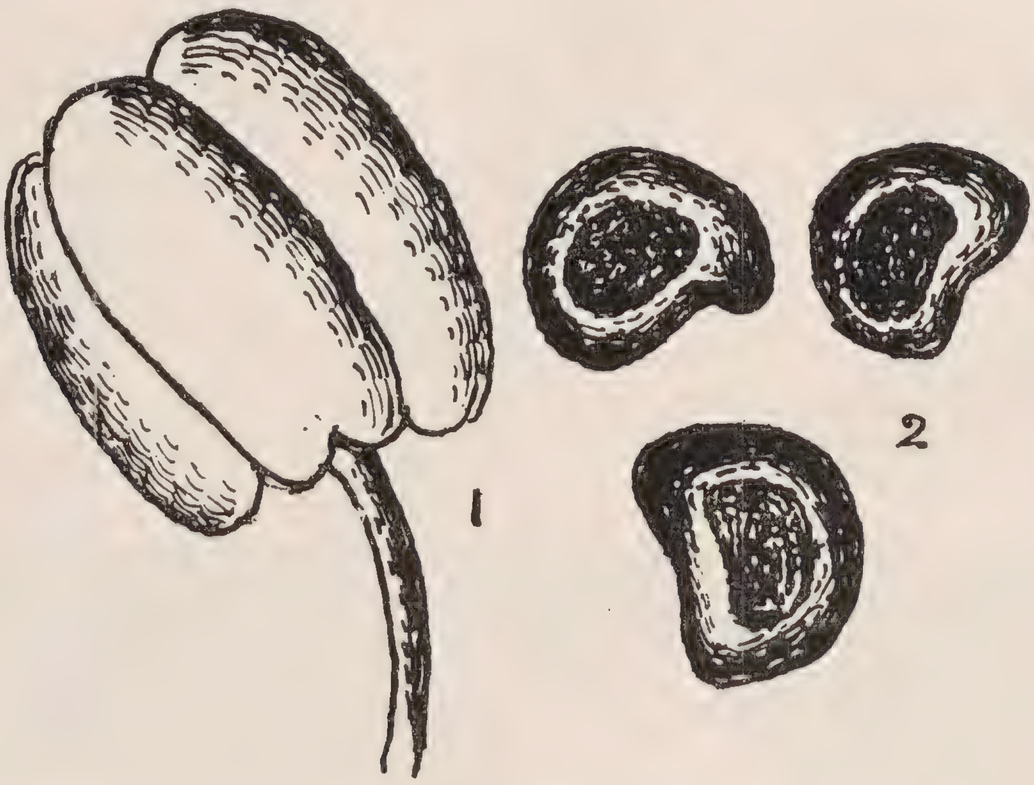

Fig. 10. *Amaryllis pseudopardina* Cardenas, *sp. nov.;* 1. capsule and 2. seeds (natural size).

**Amaryllis yungacensis** Cardenas et Nelson, **sp. nov.**

Bulbus globosus 5—7 cm. long. Foliis loratis 30—50 cm. long. 2—3.5 cm latis a basim angustatis, viride glaucescentis. Scapo 25—35 cm long. 12 mm a basim crasso, viridis. Umbella 2 flora. Bracteis spathaceis atro purpureis 5—6 cm long. Pedicellis 2—3 cm long. 5 mm crassis, dilute viridis. Floribus fere actinomorphis, 11 cm long. Ovario 1 cm long, 8 mm crasso atro viridis. Tubus brevis 4 mm long. atro viridibus. Setepalsegmentis late lanceolatis 10 cm long. 3—4 cm latis, mucronatis, inferne diluto viridis, superne atro vinoso rubis. Petepalsegmentis lanceolatis 9.5 cm long. 2.5—3 cm latis, inferne viridibus, superne atro vinoso vel lilacino rubis. Paraperigonium temperato viridis 2 mm altis, pectinatis. Staminibus 8—9 cm long. sursum curvatis; filamentis diluto viridis; antheris 7 mm long. flavis. Stylo stamina superans 11.5 cm long. inferne diluto viridis, superne albis. Stigma 2 mm crasso, trilobata, magenta.

Patria: Bolivia. Provincia Sud Yungas. Departamento La Paz, prope Rio Solacama, 1,800 m.

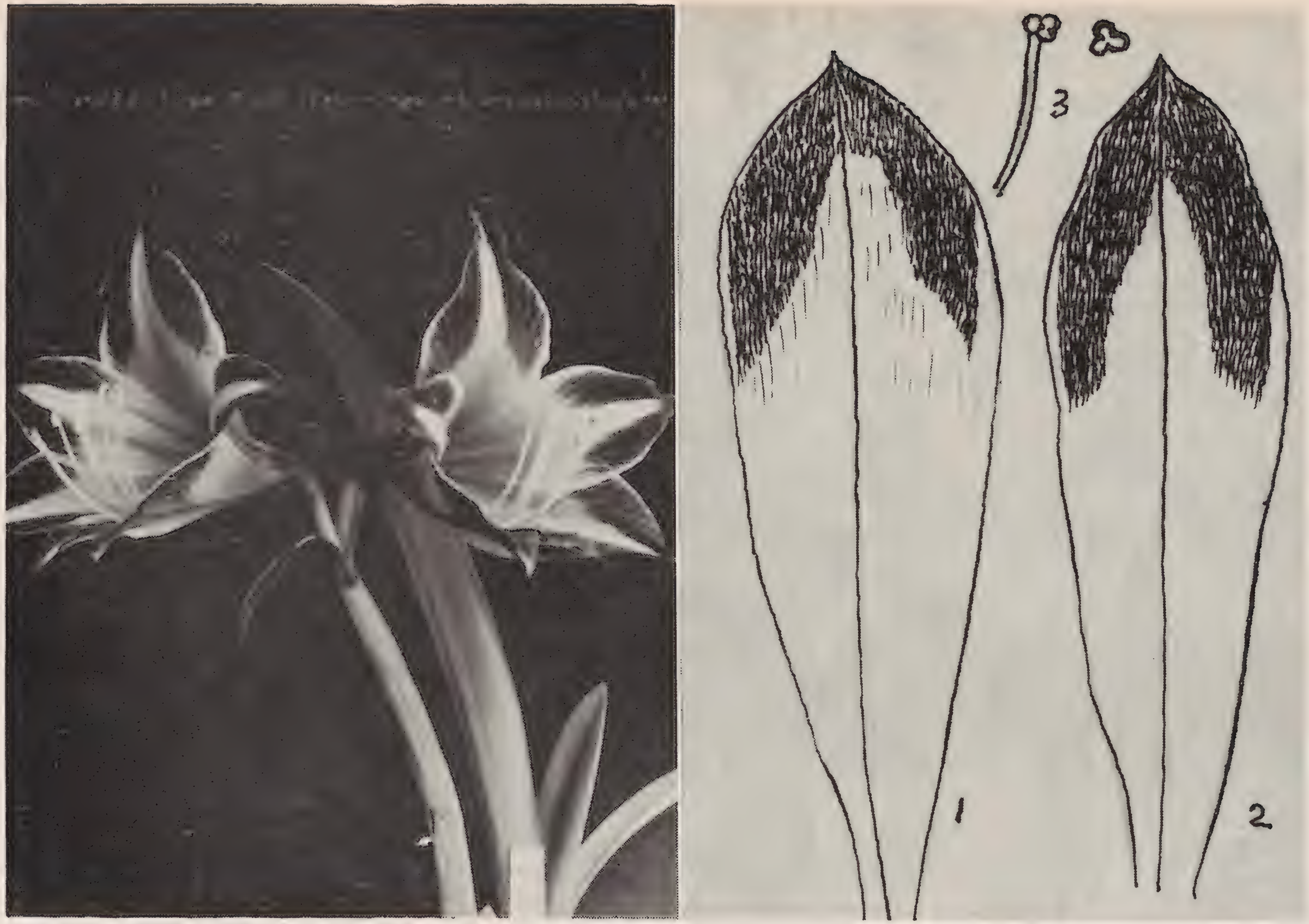

Fig. 11. *Amaryllis yungacensis* Cardenas & Nelson, *sp. nov.* (left), flowering scape and leaves; (right) 1. setepalseg, 2. petepalseg, and 3. stigma (natural size).

Bulb globose 5-7 cm long. Neck of bulb 3.5 cm long. Leaves lorate, 30-35 cm long, 2-3.5 cm wide, narrow at base, grayish green (moderate yellow green—Nickerson Color Fan 5GY 5/6). Scape 25-55 cm long, 12 mm thick at base, green with a purple flush at the base. Umbel 2-flowered. Spathe valves purplish red and remain fresh for 2 to 3 days after anthesis, 5-8 cm long, 1.5 cm wide. Pedicels 2-5.9 cm long, light green, 5 mm thick. Open flowers quite regularly actinomorphic about 11 cm long and 13 cm wide. Ovary 1.5 cm above, 8 mm below, 7-8 mm thick, olive green tinged with red. Tepaltube short 4 mm (1.7 above, 1.3 below) same color as ovary. Top setepal broadly lanceolate 10-12 cm long, 3-4.4 wide mucronate. Lower sepals 10-11.9 cm long, 3.9-4.-1 wide mucronate. Setepalsegs with basic ground color of yellow green (brilliant yellow green—Nickerson Color Fan 2.5GY 8/9) fading to almost white on segment margins. Upper 1/3 of segments dark red (moderate red—Nickerson Color Fan 2.5R 4/10) with deeper red venation (dark red—Nickerson Color Fan 2.5R 3/7). Wide yellow green keel extends from base to tip of segments on inner surface only. Bottom petepalseg 9.5-11.2 cm long, 2-2.75 cm wide, lanceolate, colored same as setepalsegs. Keel on inner surface does not extend to tip of segment. Upper petepalsegs 9.5-11.7 cm long, 2.5-3.5 cm wide lanceolate. Colored same as bottom petepalseg. The two upper petepalsegs are more reflexed. The lower petepalseg is slightly plicate near the base to support the androecium. Paraperigone light green callus 2 mm thick with incurved white hair-like appendages. Filaments of 2 length groups 8.0-10.3 cm long, ascending, yellow green below fading to white above. Anthers 1.25 cm long before dehiscence, 7 mm long after dehiscence, yellow. Style longer than stamens, 11.5-13.7 cm, yellow green at base fading to white above. Stigma 2 mm thick, strongly trilobed, magenta. Fruit, 3-celled, many seeded, dehiscent capsule about 3.5 cm in diameter. Seed, flattened, D-shaped, very thin and paper like, turning black at maturity, to 1.8 cm long, 1.0 cm wide.

Bolivia, Province of Sud Yungas. Department of La Paz. Banks of River Solacama, Nov. 7, 1958, M. Cardenas and I. S. Nelson, No. 6093 (Holotype) in Herbarium Cardenasianum, No. U.S.L. 1786, Ornamental Horticulture Herbarium, University of Southwestern Louisiana.

Obs. Bulbs of this species were introduced into the United States by both collectors since 1958. In 1960 Cardenas examined the type species of *Hippeastrum Mandonii* Baker at Kew Herbarium and it seemed that our species from Rio Solacama might be *A. mandonii* (Baker) Traub and Uphof. The same year he saw at the Paris Natural History Museum several duplicates of Mandon's collection from Rio Challasuyo, near Sorata, Bolivia, which were not named. After returning to Bolivia Cardenas went to the type locality of *A. mandonii* and collected several bulbs. These bulbs which bloomed in cultivation at Cochabamba, Bolivia, proved to be among the most beautiful *Amaryllis* known from Bolivia if not from anywhere else, but differed from the collection from the banks of the Solacama River. Thus we arrived at the conclusion that the Solacama River plants represent a species new to science. It has been described above with the following differential characteristics: The flowers are much more regular than those of *A. mandonii,* the red coloration is darker, the flowers are keeled with yellow green on the inner surface of the segments, it is found at nearly 1000 M. lower and in a much warmer and more humid atmosphere.

At a glance the dry herbarium specimens of both taxa seem very similar but a comparison of living materials readily reveals the extent that the more acute flower segments of *A. mandonii* are connivent and all are the color of the Bolivian Flag, that is blood red at the tips, yellow in the center and greenish in the throat. The white margins on the segments of *A. yungacensis* are not present on *A. mandonii.*

*A. yungacensis* has proved easy to flower in cultivation once it became established. Seed set is readily obtained by using pollen from a different clone from the pod parent. This should prove to be a valuable species for the hybridizer.

It is of interest to point out that with the description of these new species, the number of *Amaryllis* species known from Bolivia numbers over 30, which is a larger number than from any other South American Country.

*University of San Simon,*
*Cochabamba, Bolivia*

## COMMENTS ON AMARYLLIS PSEUDOPARDINA

With reference to *Amaryllis pseudopardina,* the editor, under date of Aug. 1, 1964, made the following comments in a letter to Dr. Cardenas:

''With reference to *Amaryllis pseudopardina,* this is the closest match with *Amaryllis leopoldii* that has been found up to the present. This species has been lost for almost a century and many have searched for it. The only difference appears to be the color pattern, particularly in the throat. However, such color variations are often found in *Amaryllis* species. Thus, it may be that this plant will later be recognized as *A. leopoldii.* The rediscovery of this species will be hailed as a really important event.''

### DR. CARDENAS LETTER, AUG. 27, 1964

In reply, under date of Aug. 13, 1964, Dr. Cardenas commented:

''Your comments about *Amaryllis pseudopardina* are very interesting. Really, with the exception of the white bifid bar appearing in the throat of *A. leopoldii,* my new species has all the floral morphology of *leopoldii.* Pearce, as well as the other early collectors of ornamental plants, were obliged by business reasons to avoid the mention of the right places where they found the most valuable plants. According to Pearce, *A. leopoldii* and also *A. pardina,* are from Peru. However, to my knowledge they have not been recollected in that country. On the contrary, at least *A. pardina,* in two varieties, has been found by Prof. Nelson and me as true wild plants in Bolivia. The typical *A. pardina,* I found in 1959 at Apolo, where Pearce collected. The other variety with stripe-lines instead of dots of blood-red on cream or whitish tepalsegs, was found by Prof. Nelson at Santa Cruz and by me in Yungas of La Paz. In the latter locality, Pearce also collected. But *A. pseudopardina,* comes from Yungas de Corani where according to the itinerary of Pearce, provided for me by Mr. Sandwith from Kew Gardens, Pearce did not enter.

''One striking thing is that years ago while inspecting a large number of commercial *Amaryllis* grown by Mr. Lancaster in Cartago, near San Jose de Costa Rica, I noted that most of the hybrid segregate plants showed flowers of the pattern reminiscent of *A. pseudopardina.*

''Lastly, when I spent a few days at La Paz in June, I saw for the first time flowers of *A. pardina* and *A. vittata tweediana* at the Flower Market. I asked where they came from and I was told that they were gathered from the wild in Yungas of La Paz. The *A. pardina* I saw this time had the appearance of *A. pseudopardina* except for the solid blood-red zone in the middle of the tepalsegs which had instead very dense pencilings of the same colour.''

In reply to Dr. Cardenas' letter of August 13, the Editor reported (Sept. 7, 1964) that he wrote to Dr. Sandwith at Kew Gardens for a copy of the Pearce itinerary mentioned by Dr. Cardenas, and received the following reply:

''Replying to your letter of Aug. 20th about a Pearce itinerary reported by Dr. Cardenas, I am afraid that is a slight misunderstanding. There is no such definite itinerary. There are only sheets of foolscap with localities and dates and territories jotted down, as Dr. T. A. Sprague and I found them on herbarium labels, for our private use. These are often used by botanists who visit us, because many of Pearce's localities are so obscure, and it is convenient to look on our little collection to see if any given one is there, and in what country between Ecuador and N. W. Argentina it lies, but our list of course is not complete, is in no sense an ''itinerary'', and is quite unfit for publication. Believe me, yours sincerely, (signed) Noel Y. Sandwith.'' Aug. 27, 1964.

The Editor stated further in his letter to Dr. Cardenas (Sept. 7, 1964): ''Thus Pearce could have collected in Yungas de Corani. Apparently, he collected only bulbs without flowers and thus there are no herbarium specimens of some of his *Amaryllis* species. We have been looking high and low for anything closely resembling his *Amaryllis leopoldii*, and your *A. pseudopardina* may turn out to be the long missing species.''

''From the reported data, *Amaryllis leopoldii* was placed in the subgenus AMARYLLIS by Baker. Thus it will have to be moved to the subgenus AULICA. Baker did not know that it had a pronounced paraperigone.''

## DR. CARDENAS LETTER, SEPT. 27, 1964

In reply to the editor's letter, Dr. Cardenas wrote under date of Sept. 27, 1964, ''the place where this species (*Amaryllis pseudopardina*) was found by one of my students and where I did travel 10 days ago, is quite out of the regular travel routes. We went by car from Cochabamba to Limbo in the direction of Chapare (124 Km.). From there it was necessary to go by a narrow mule path which was very difficult to negotiate even on foot. I traveled only 10 Km., because the descent was very steep. I sent two students to a place 5 Km. downward. I retraced the 10 Km. back upward to Limbo which took three hours. By evening, the students came back bringing bulbs of *Amaryllis pseudopardina* with flower scapes in bud attached. The next day we returned to Cochabamba. Thus it took three days' journey to collect the precious bulbs. Twenty flowering-sized bulbs were sent by air freight to Prof. Nelson for distribution in the United States.''

The bulbs are being distributed by Prof. Claude W. Davis of Baton Rouge, Louisiana. He has notified his customers and long before the members read this note, they will have been exhausted. Thus many will have to wait until seeds are produced which might be sold directly, or they could be planted and sold when the bulblets are large enough. Thus after almost a century, the long lost *Amaryllis leopoldii* has been found.

In an earlier letter (dated Sept. 3, 1964), Dr. Cardenas indicated that the species is located on a quite inaccessible cliff. Thus the members are in debt to Dr. Cardenas for the reintroduction of *Amaryllis leopoldii.*

## PLACEMENT OF BULBS

The 22 bulbs sent to the United States by Dr. Cardenas have been placed as follows (Prof. Nelson received two for the collection at the University of Southwestern Louisiana; all others received one bulb):

Prof. Ira S. Nelson, Department of Horticulture, U. S. L., Lafayette, La.
Mrs. H. W. Tucker, 3612 Byron Street, Baton Rouge, La.
Mr. Fred Buchmann, 1766 Avondale Drive, Baton Rouge, La.
Mr. Joseph K. Mertzweiller, North Parkway Drive, Baton Rouge, La.
Prof. Claude W. Davis, 470 Delgado Drive, Baton Rouge 8, La.
Mr. Lewis Lloyd, P. O. Box 19686, New Orleans 19, La.
Mrs. Morris W. Clint, 2005 Palm Blvd., Brownsville, Texas.
Dr. Clair Brown, Dept. of Botany, L.S.U., University Station, Baton Rouge 3, La
Mrs. Camilla B. Truax, Box 246, St. Francisville, La.
Mr. Earl E. Vallot, Grandview Nursery, RFD, Box 54, Youngsville, La.
Mr. Charles Ramelli, 128 Jeff Davis Avenue, Biloxi, Miss.
Mr. Robert D. Goedert, P. O. Box 6534, Jacksonville, Florida 32205.
Mrs. Alton J. Hoffman, 205 Rees Street, Breaux Bridge, La.
Mr. Hugh L. Bush, P. O. Box 1371, Columbia, S. C., 29202.
Mr. Joe L. Stanley, 2203 West 9th Street, Austin, Texas.
Mrs. A. C. Pickard, 1702 North Blvd., Houston, Texas 77006.
Mr. Everett E. Cook, Box 135, Gulfport, Miss.
Mr. W. D. Morton, 3114 State Street Drive, New Orleans 25, La.
Mr. W. J. Perrin, 4753 Press Drive, New Orleans 26, La.
Mr. James E. Mahan, 3228 Palmyra Street, New Orleans 19, La.
Mr. W. R. Latapie, 3737 Elysian Fields Avenue, New Orleans 22, La.

It is not known if this species is self-fertile. In case it should prove to be self-sterile, those listed may be able to exchange pollen and thus make good such a deficiency, if it should exist.

It is also suggested that the members report on their experiences with this species in future issues of the Amaryllis Year Book.

## LYCORIS JOSEPHINAE, SP. NOV.

HAMILTON P. TRAUB

In 1945, Miss Josephine Henry obtained a small-leaved form of *Lycoris* in China. When it finally bloomed here at La Jolla, Calif., in 1964, it was noted that it differs from *Lycoris radiata* var. *radiata*, the biological type, and *L. radiata* var. *triploidia* (the triploid form). When grown under the same soil and cultural conditions here at La Jolla, Calif., the leaves are less upright, and it blooms much later (last days of August through September) as contrasted with *L. radiata* var. *radiata* which blooms in July. It also differs in phenontological characters. The scape is much stouter and taller, the flowers are Delft-rose (HCC-020) the widest leaves are slightly wider than in *L. radiata* var. *radiata,* and they are a deeper green, glabrous, with lighter glaucescent stripe in center, and glaucescent on under side with a glabrous green keel in center. Since the blooming seasons are different, it is reproductively isolated from *L. radiata* var. *radiata,* and it is thus entitled to specific rank. It has been named for Miss Josephine Henry of Gladwyne, Penna., who brought it to the United States.

### **Lycoris josephinae** Traub, **sp. nov.**

A L. radiata var. radiata differt scapo valde robustiore longioreque, floribus ''Delft''-roseis, characteribus foliorum, et anni tempo florente tardiore (a ultimis diebus Sextili usque ad finem Septembri).

*Rootstock* bulbous. *Leaves* several per bulb, narrow, linear, up to 8 mm. wide, deep green, glabrous, with lighter glaucescent strips in center, glaucescent on under side with a narrow glabrous green keel in the center. *Scape* solid, stout, up to 37 cm. tall, reddish in lower ¼, dull greenish above, 9x10 mm. diam. (base), 5x6 mm. diam. (apex). *Spathe* 2-valved, lanceolate, acute, up to 4.3 cm. long. *Umbel* 8-flowered, segs, stamens and style Delft rose (HCC-020), tepalsegs ruffled on the margins, upper ½ decidedly recurved; stamens and style much exserted. *Pedicels* 6-7-9-10 mm. long at anthesis. *Ovary* 6 mm. long, 4 mm. in diam. *Tepaltube* 5 mm. long. *Paraperigone* of 6 single minute rose-colored teeth between the segs at the base. *Tepalsegs* 4 cm. long, 5 mm. wide, acute. *Stamens* and *style* much longer than tepalsegs. *Style* subequaling the longest stamens. Anthers 4 mm. long at anthesis, pollen yellow. *Stigma* minute.

HOLOTYPE: Traub #972 (TRA), 8-29-64, cult., La Jolla, Calif.; from bulbs obtained by Miss Josephine Henry, Gladwyne, Penna., in

China, July 1945, from a soldier on mosquito patrol. He got them from a ledge west of the Min River, not very far from the Hsin Ching Base, almost on the Min River, about 30 miles southwest of Cheng-tu.

## SPREKELIA CLINTIAE, SP. NOV.

HAMILTON P. TRAUB

In June 1952, Mrs. Morris Clint obtained bulbs (Clint No. 266) from Mrs. Chester Wheelock of Brownsville, Texas, which had been brought in from Guadalajara, Jalisco, Mexico, in the spring by an employee. Mrs. Clint shared the bulbs with the writer. It was noted that the leaves were linear, glaucous. Although they were given good care they consistently failed to bloom until 1964, when one bulb bloomed on June 17. It was at once apparent that it could not be placed with *Sprekelia formosissima*, the only species in the genus recognized up to the present. The new species has been named for Mrs. Clint in recognition of her important work toward the collecting of the amaryllids of Mexico.

*Sprekelia clintiae* Traub, *sp. nov.*

Herba bulbosa; foliis glaucis linearibus obtuse acutis; scapo 14 cm. longo; spatha parte 1/3 inferiore connata; umbella uniflora; perigonio leviter irregulari S. formosissimam aliquoversum "vino-rubello" -roseo; pedicello 5.2 cm. longo; ovario 1 cm. longo; segmentis sepalorum 7.2—7.6 cm. longis 1.1—1.4 cm. latis lanceolatis acutis; segmentis petalorum 7.4—8.2 cm. longis 7—9 mm. latis linearibus acutis; staminibus styloque fasciculatis declinato-adscendentibus, segmentos longissimos brevioribus; stylo stamina paulo breviore; antheris versatilibus 6 mm. longis; stigmate breviter trifido.

Holotype: Traub No. 975 (TRA), 6-17-64, La Jolla, Calif., from bulbs obtained originally from Guadalajara, Jalisco, Mexico.

Rootstock bulbous. Leaves several, linear, glaucous, 28.5 cm. long, 1.1 cm. wide at the base, 1.2 cm. wide at the middle, bluntly acute, shallowly chanelled in lower ¼; contemporaneous with the flowers. Scape 14 cm. long, 6 x 8 mm. diam. (base), 5 x 6 mm. diam. (apex); flattened, roundish edges; greenish, tinged reddish in lower ¼. Spathe 6.6 cm. long, 7 mm. wide, united for 3 cm. below, free portion above fenstrated slightly near the acute apex. Umbel 1-flowered; flower declinate; perigone slightly irregular in the direction of *Sprekelia formosissima*, color claret rose (HCC-021/1) inside and outside, whitish stripe in lower ¼ to ½ of segs, the whitish stripe wider in the upper seg. Pedicel 5.2 cm. long. 5 x 5 mm. in diam. Ovary declinate, 1 cm. long. 6 x 7 mm. in diam., green, tinged reddish above. Tepaltube very short, 1—2 mm. long. Tepalsegs somewhat irregularly arranged; setsegs 7.2—7.6 cm. long, 1.1—1.4 cm. wide, lanceolate, acute; petsegs 7.4—8.2 cm. long, 7—9 mm. wide, linear acute. Stamens and style fasciculate, declinate-ascending, stamens 6—7.2 cm. long; anthers 6 mm. long at anthesis, versatile; style 8.5 cm. long; stigma shortly trifid.

# CRINUM X LAJOLLA CL. 'MARJORIE ANTHES'

HAMILTON P. TRAUB

In the 1963 PLANT LIFE (vol. 19, page 60), a hybrid between *Crinum strictum* var. *traubii* Moldenke ♀ (PLANT LIFE 18: 9-50, 1962) x *Crinum moorei* (tall light pink form) ♂, was named *Crinum* x *lajolla* Traub. The Spanish, ''La Jolla'' (pronounced ''lahoya'') means ''The Jewel''.

The flowers of this hybrid vary from very light pink (almost white) to medium pink, and to a deeper very beautiful Persian rose (HCC-628); and have a delightful fragrance. It is of interest to note that the crossing of a white-flowering with a light pink-flowering plant has given progeny with a much deeper color—Persian rose—not heretofore seen in either species. The plants are of easy culture, evergreen and decorative. It appears worth while to name the best of the Persian-rose-flowering clones so that it may be introduced.

**Crinum** x **lajolla** cl. 'Majorie Anthes', **new clone**

Similar to the other clones of *Crinum* x *lajolla* Traub, excepting that its flowers are a beautiful Persian rose (HCC-628).

The clone has been named for Mrs. Marjorie Anthes, of Encinitas, Calif., a gardener of outstanding talents.

# NATIVE AND INTRODUCED AMARYLLIDS IN ARGENTINA

C. G. RUEPPEL, *Casilla 370, Mendoza, Argentina*

I live in Mendoza Province, which together with San Luis and San Juan Provinces, make up the three ''Provinces de Cuyo'', a region with similar soil and climatic conditions—the vineyard of my country.

## NATIVE AMARYLLIDS

In the wild, the tribe *Zepyhranthes* is generally represented by many interesting species, one of these is the small yellow *Zephyranthes filifolia*, I believe. The tribe *Eustephieae* is represented with a many-flowered, red *Phycella* (?), and 100 kms. northward, in a dry sandy location called, ''El Ramblon'', grows by the hundreds, *Hieronymiella chlidanthoides* Pax, with its many-flowered scapes of white, scented flowers.

Thus I have plenty of material at home and am preparing notes for future contributions.

## INTRODUCED AMARYLLIDS

Recently, 4 medium-sized bulbs labeled ''Pancratium'' were sent to me from Salta Province, and 2 large bulbs from Jujuy Province, similar to those of subgenus *Ismene* of genus *Hymenocallis*. They were badly injured in digging so that only part of the stems was saved. I placed them in an empty pot in the greenhouse believing that they might rot.

On the way back from Paraguay, where I visited friends in the City of Formosa, the capital of the province of the same name, I obtained some amaryllids. In the wilds of Formosa grow by the hundreds, *Amaryllis elegans* var. (?). There in a friend's garden, I got a very rare bulb—rather large, with opposite, broad, petiolate leaves, dark, shining green. At home, after proper cleaning and disinfection, I rested the bulbs for three months in dry sand in a sheltered room.

In September (early spring here), I placed the ''Pancratium'' and the ''Ismene-type'' bulbs in good garden soil with good drainage. In spite of their injury, the latter were in good condition. The petiole-leaved amaryllid from Formosa was placed in an 8-inch pot in rich sandy compost, about Oct. 15, 1963. All four pots were placed in partial shade.

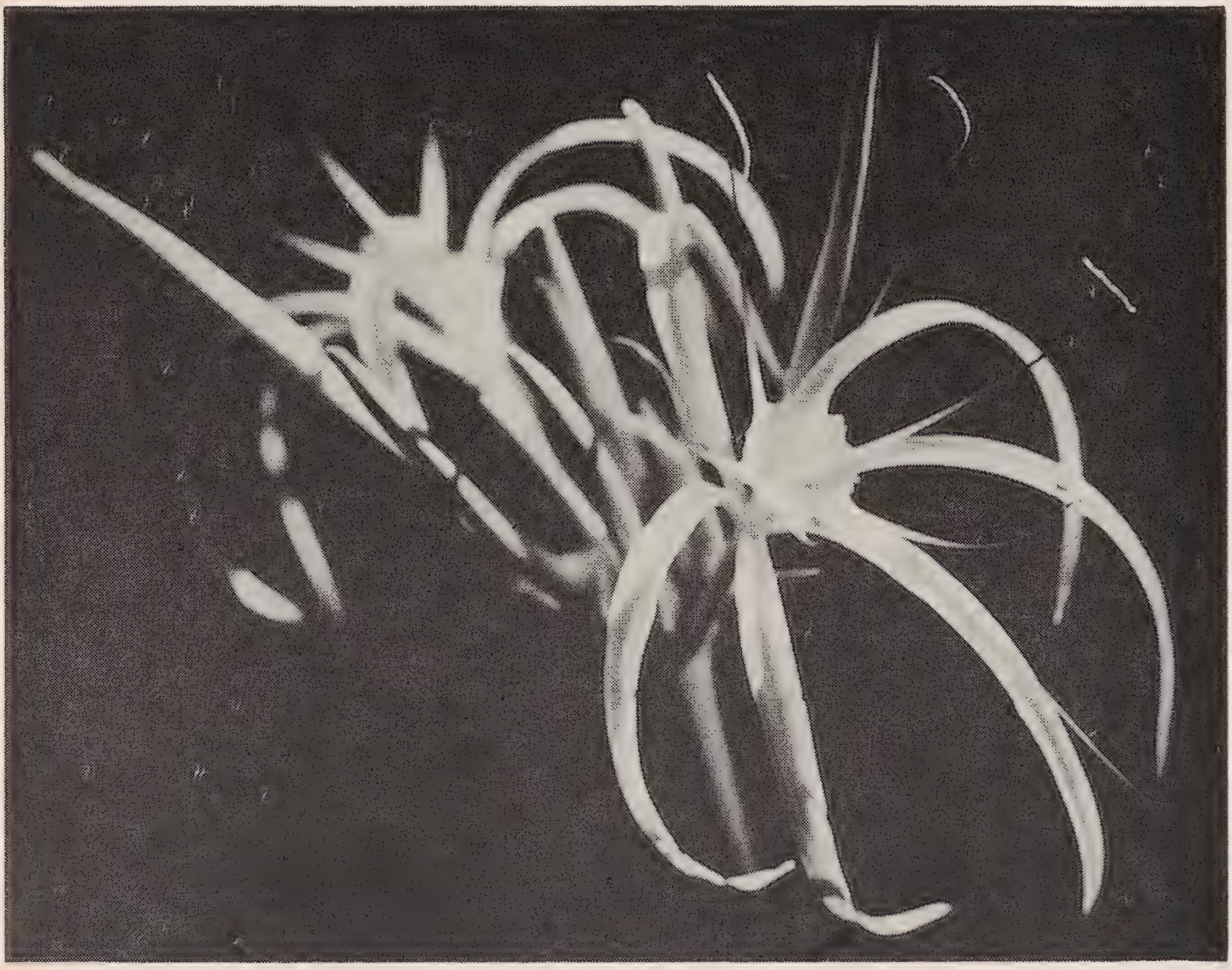

Fig. 12. *Hymenocallis speciosa;* flowering scape as grown by Dr. C. G. Rueppel in Mendoza, Argentina.

The first to bloom was the ''Pancratium'', on Dec. 1, 1963 (late spring). The scape when fully developed turned out to be *Hymenocallis expansa* which is native to the West Indies. Thus, at last I had an example of subgenus *Hymenocallis,* with broad sessile leaves, 1 foot long. The umbel was many-flowered, the flowers white, scentless.

The Ismene-type bulbs made sturdy plants. From the basal part (wounded stem), many (about 18)young offsets were produced. Then on Dec. 20, 1963, I had two scapes of *Hymenocallis* (subgenus *Ismene*) *narcissiflora*.

With me *Hymenocallis* x *festalis* usually blooms at the beginning of summer, bearing large many-flowered-scapes, with large, white, scented flowers. I was able to identify these from Dr. Traub's Key to the subgenera of the genus *Hymenocallis,* Plant Life 1962, page 68. This is the hybrid of *H. narcissiflora* and *H. longipetala,* and is known as *H.* x *festalis,* with criss-crossing stamens. The parents are native to Peru.

Contemporarily with *Hymenocallis* x *festalis,* the petiolate-leaved amaryllid obtained from Formosa produced a strong scape, with up to 10 flowers in the umbel. The leaves were well developed at anthesis, wedge-shaped at the base, with well-developed thick petioles 10 cm. long, 1.1 cm. wide, blades 25 cm. long, 9 cm. wide. The scape was flattened with sharp edges, 46 cm. long, 1.7 cm. in diam. (base), 1.1 cm. diam. (apex).

The spathe 2-valved, free, 6 cm. long, 3 cm. wide, and many smaller broadish bracteoles. Ovary sessile, many ovules per cell. Tepaltube 6 cm. long, 2.5 mm. in diam., light green; staminal cup white, 3 cm. long, 2 cm. wide. Filaments and style, white in lower ⅓ green above. Style 3 cm. longer than the stamens; anthers filiform, crescent-shaped; pollen dark orange brown; stigma capitate.

The flowers open one by one, are very long lasting, and thus 10 days later I had a wonderful umbel, measuring a foot in diameter by 17 cm. high. It is delightfully scented all day long. It was hand pollinated but I got only one big, green fleshy seed which unfortunately rotted. The bulb has made no offsets.

Fig. 12 shows the scape in flower which was identified as *Hymenocallis speciosa* from the West Indies and Mexico (see Traub's Key, Plant Life 1962).

# CHROMOSOME NUMBER AND MORPHOLOGY IN **TULBAGHIA**

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## INTRODUCTION

The genus *Tulbaghia* is much in need of taxonomic revision, and the phylogenetic relationships of this genus, with certain of its relatives, are still unclear. The chromosome morphology and number of available *Tulbaghia* taxa have been studied, and the results are reported here for aid to the eventual solution of the problem.

*Agapanthus* and *Tulbaghia* are petaloid monocotyledons which are indigenous to Africa. Because of a rhizomatous rootstock, an umbellate inflorescence subtended by two or more bracts, and the presence of 6 stamens, there seems to be little doubt that the two genera are closely related. Most taxonomic systems since that of Bentham and Hooker in 1883 have placed them in the same tribe (Table 1). Baker in 1896 included both genera in tribe Allieae, but most other systematists have considered them sufficiently distinct to separate these two genera in the tribe, or at least subtribe, Agapantheae. Traub in 1963 (Table 1), however, again excluded *Tulbaghia* from Agapantheae, replacing it in Tribe Allieae.

Until the researches of Hutchinson in 1934 (2nd edition, 1959), *Agapanthus* and *Tulbaghia* were considered as members of the Liliaceae. Hutchinson's definition of the families Liliaceae and Amaryllidaceae, however, caused them to be moved to the latter family. He considered the tribe Agapantheae to be the most primitive of the Amaryllidaceae since both *Agapanthus* and *Tulbaghia,* which he includes therein, retain a rhizomatous rootstock which is a dominant characteristic of the more primitive family Liliaceae. Such a root system is suggested in but few other genera of the Amaryllidaceae. Thus these two genera exhibit several characters which make their occurrence as a connecting link between the Lilliaceae and the Amaryllidaceae a tempting postulate. The taxonomic history of *Agapanthus* and *Tulbaghia* is summarized in Table 1.

Table 1. Taxonomic History of **Agapanthus** and **Tulbaghia.**

| Authority | Family[1] | Tribe | Subtribe | Genera |
|---|---|---|---|---|
| Bentham & Hooker (1883) | Liliaceae | Allieae | Agapantheae | **Agapanthus**<br>**Tulbaghia** |
| Thiselton-Dyer (1894) | Liliaceae | Allieae | ............. | **Agapanthus**<br>**Tulbaghia**<br>**Allium**<br>**Massonia**<br>**Daubenya** |
| Engler & Prantl (1930) | Liliaceae[2] | Agapantheae | ............. | **Agapanthus**<br>**Tulbaghia** |
| Hutchinson (1959) | Amaryllidaceae | Agapantheae | ............. | **Agapanthus**<br>**Tulbaghia** |
| Traub (1963) | Amaryllidaceae[3] | Allieae | Allinae | **Allium**<br>**Nectaroscordum**<br>**Caloscordum**<br>**Steinmannia**<br>**Nothoscordum**<br>**Leucocoryne**<br>**Tulbaghia**<br>**Stemmatium**<br>**Tristagma** |
| | | Agapantheae | ............. | **Agapanthus** |

[1] Bentham & Hooker (1883) and Thiselton-Dyer (1894) used the category name "Order" rather than "Family".

[2] Engler & Prantl (1930) placed the tribe **Agapantheae** in the subfamily **Allioideae.**

[3] Traub (1963) placed the tribes **Allieae** and **Agapantheae** in the subfamily **Allioideae.**

## REVIEW OF CYTOLOGICAL LITERATURE

*Index Kewensis* (1885-1955) lists 15 species of *Agapanthus,* all of which were described from the Cape area of South Africa. However, there is no general agreement in the literature as to the validity of this number. Riley and Mukerjee (1962) reported the somatic chromosome numbers and chromosome morphology for 5 putative species and 2 unidentified plants. This is the most extensive cytological treatment of this genus published and the descriptions are referred to in this paper in the discussion of the phylogeny of the tribe. Other cytological studies have been carried out by Darlington (1933), Mookerjea (1955), and Sharma and Sharma (1961). Table 2 lists the known chromosome numbers for *Agapanthus* and *Tulbaghia*.

Cytological accounts of *Tulbaghia* are scanty and deal with only 3 of the 30 species listed by *Index Kewensis*. This genus is distributed throughout southern and tropical Africa. Chromosome reports were made by Whitaker and Flory (1955) and they reported a gametic number of 6 for *T. violacea* and a somatic number of 12 for *T. cepacea* and *T. fragrans*. In 1955 Flory reported that the somatic chromosome numbers for 5 additional, unidentified, taxa were being studied, with chromosome numbers determined. Four of these are listed in Table 2, and the fifth (*T. sp.* 3359-1) was found to have 12 somatic chromosomes. Other cytological studies of the genus were carried out by Mookerjea (1955), Sharma (1956), and by Riley and Hoff (1958) who each dealt, also, with one or more of the above mentioned species. Sato earlier (1942) had reported the number for *T. aloides* (Table 2), a taxon not found listed in *Index Kewensis*.

Table 2. Chromosome numbers in **Agapanthus** and **Tulbaghia.**

| Species | 2n | Authority |
|---|---|---|
| **Agapanthus** | | |
| **campanulatus** | 30 | Riley and Mukerjee, 1962 |
| **globosus** | 30 | Sharma and Sharma, 1961 |
| **inapertus** | 30 | Sharma and Sharma, 1961 |
| | 30 | Riley and Mukerjee, 1962 |
| **minimus** | 30 | Riley and Mukerjee, 1962 |
| **orientalis** | 32 | Riley and Mukerjee, 1962 |
| **praecox** | 32 | Riley and Mukerjee, 1962 |
| **umbellatus** | n=15 | Darlington, 1933 |
| | 30 | Sato, 1942 |
| | 30 | Mookerjea, 1955 |
| sp. 148/55 | 30 | Riley and Mukerjee, 1962 |
| sp. 71/50 | 29 | Riley and Mukerjee, 1962 |
| **Tulbaghia** | | |
| **aloides** | 12 | Sato, 1942 |
| **cepacea** | 12 | Whitaker and Flory, 1955 |
| | 12 | Riley and Hoff, 1958 |
| **fragrans** | 12 | Whitaker and Flory, 1955 |
| **violacea** | n= 6 | Whitaker and Flory, 1955 |
| | 12 | Mookerjea, 1955 |
| | 12, (6, 24) | Sharma, 1956 |
| | 12 | Riley and Hoff, 1958, 1960 |
| sp. 1851 | 12 | Flory, 1955 |
| sp. 5076 | 12 | Flory, 1955 |
| sp. 7249 | 12 | Flory, 1955 |
| sp. 469S | 24 | Flory, 1955 |

## MATERIALS AND METHODS

The various taxa of *Tulbaghia* used in this study were secured from private collectors and commercial supply houses. Table 4 lists the source of all of the materials along with the chromosome numbers of those species not reported before.

All chromosome counts and drawings were made from metaphase stages of root tip cells pretreated in .25 per cent colchicine for 5 hours. Following pretreatment, the root tips were fixed in acetic; alcohol 1:3 for 12-24 hours. They were then hydrolyzed for 5 minutes in normal HCl and squashed in 2 per cent aceto-orcein solution. Pressure was applied to the cover glass to obtain maximum flattening of the cells. The slides were then heated over an alcohol lamp to spread the chromosomes and intensify their staining (Darlington and LaCour, 1960). Utilization of the Feulgen reaction was attempted using the method of Flagg (1961) but this seemed to result in the clumping of the chromosomes.

Observations were made from temporary preparations of slides sealed with cover glass cement. Care was taken to use only those cells for study whose walls were intact. An American Optical microscope equipped with a 90x, apochromatic, oil immersion objective (N. A. 1.30) together with paired 15x oculars was used and drawings were made with the aid of a Zeiss camera lucida at a magnification of 2000x. In drawing the chromosomes, the stage was moved slightly so that those chromosomes laying on top of another could be observed without hindrance.

## OBSERVATIONS

The chromosomes of 8 taxa of *Tulbaghia* were studied. Camera lucida drawings of metaphase plates and idiograms are given in Figures 13-19.

The chromosomes of *Tulbaghia* vary in the position of the centromere and the placement of secondary constrictions within any given taxon. The chromosomes of the genus are comparatively quite long. Swanson (1957) reports that among the higher plants, monocots generally have larger chromosomes than dicots. Warmke (1941) states that the largest chromosomes of *Trillium* are about 30 microns long. After the pretreatment and fixation described above, the chromosomes of *Tulbaghia* varied from 8.5 microns to 24 microns in length. However, there is no marked variation in length of the chromosomes within any given species. In most species with $2n=12$, there are 3 pairs which cannot be distinguished with any degree of certainty. In the case of those species with $2n=24$, there are 6 pairs which present this same problem. *Tulbaghia* sp. 469S ($2n=24$) has 11 chromosomes with similar lengths and centromere positions. For that reason, the idiograms with the accompanying figures were constructed by measuring and pairing the chromosomes of 1 cell and the length of the 2 members of each pair were averaged. However, chromosome number and morphology were verified with as many other plates as possible.

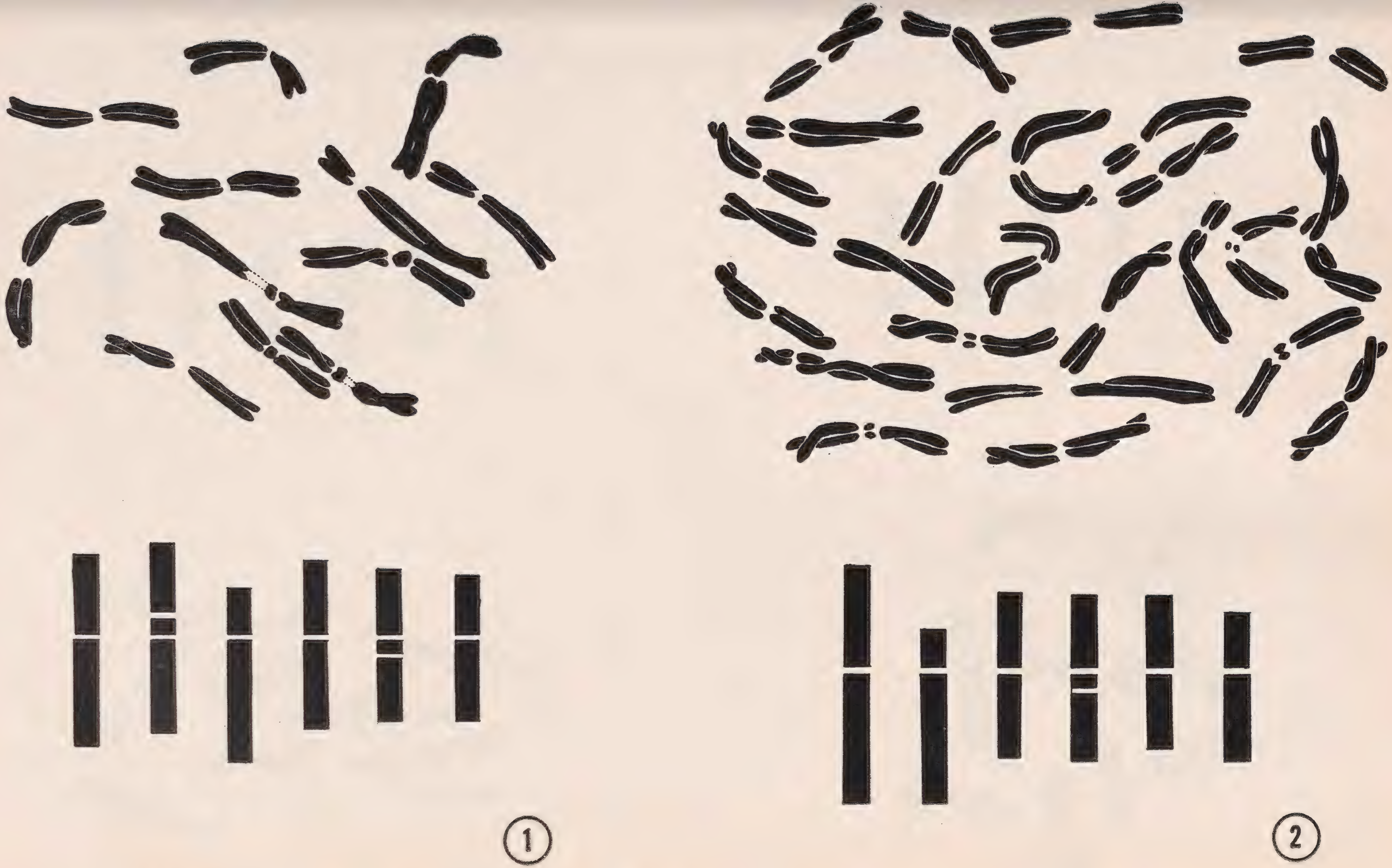

Fig. 13. Chromosomes of *Tulbaghia*: (1) *T. alliacea*, 2n=12; and (2) *T. ludwigiana*, 2n=24 (an allopolyploid form of *T. alliacea*).

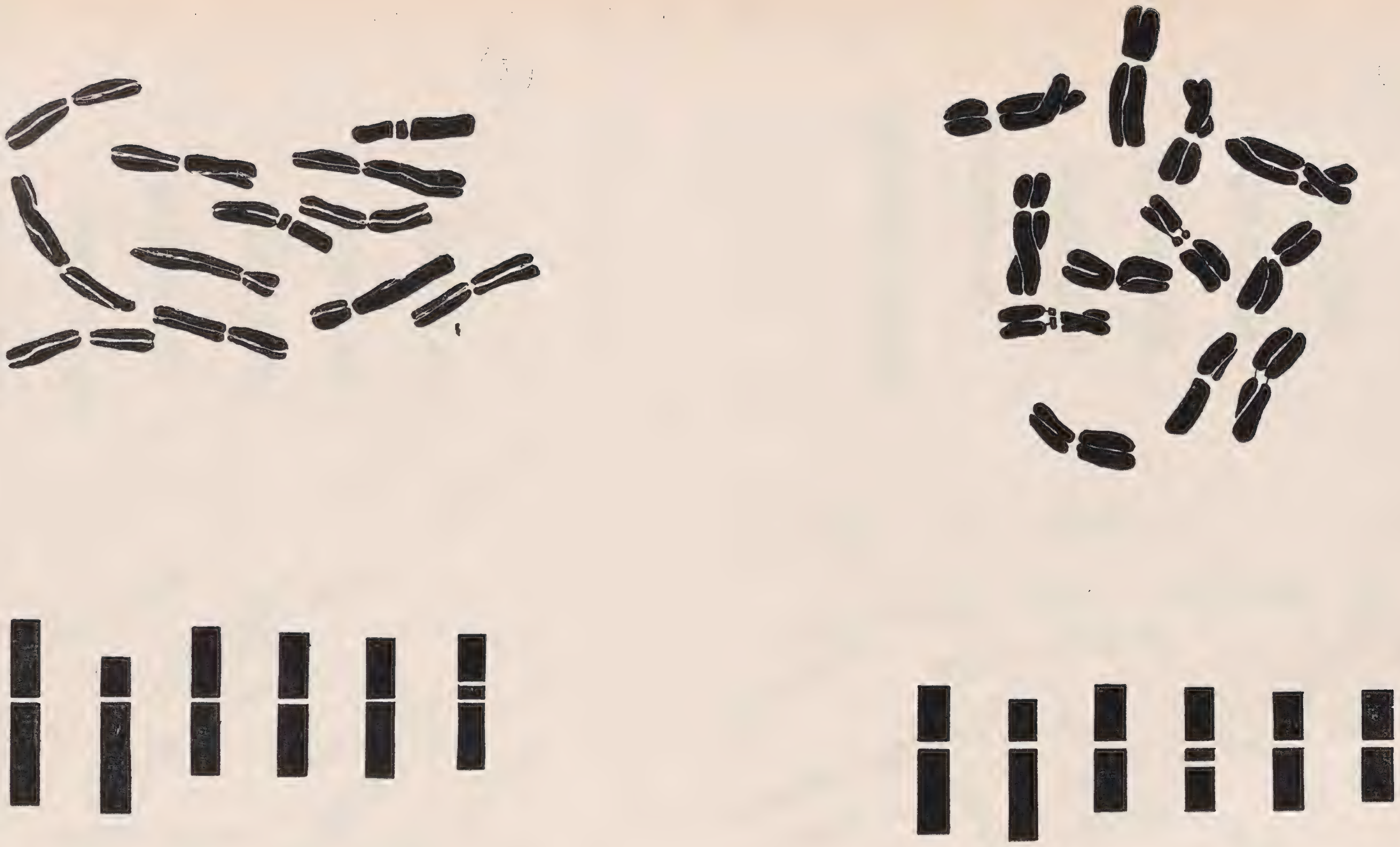

Fig. 14. Chromosomes of *Tulbaghia*: (3) *T. cepacea*, 2n=12; and (4) *T. fragrants*, 2n=12. (The chromosomes of this species are morphologically primitive).

The chromosomes were classified by centromere position and the appropriate abbreviations used in the description are given in Table 3. The formulas in the description are for the entire diploid complement. Table 4 lists the chromosome numbers of *Tulbaghia* reported for the first time.

Table 3. Classification of centromere position.

| Ratio of short arm to total length | Centromere position | Abbreviation |
|---|---|---|
| .50 - .45 | Median | M |
| .44 - .30 | Submedian | Sm |
| less than .30 | Subterminal | St. |

*T. alliacea* Linn. 2n=12. The chromosomes of this species fall into 6 morphological types which may be represented by the formula 6M+4Sm+2St. There are 4 chromosomes which have a secondary constriction. Figure 13 (1).

*T. cepacea* Linn. fil. 2n=12. There are 6 types with a formula of 6M+4Sm+2St. 2 chromosomes have a secondary constriction. Figure 14 (3).

*T. fragrans* Verdoorn. 2n=12. There are 6 types represented by the formula 6M+6Sm. There are 2 chromosomes with a secondary constriction. Figure 14 (4).

*T. leucantha* Baker. 2n=12. There are 7 morphological types represented by this species. The formula is 4M+6Sm+2St. The chromosomes are in 5 identical pairs and there are 2 chromosomes which are not alike. There is 1 chromosome with a secondary constriction. Figure 15 (5).

*T. leucantha* Baker. 2n=24. There are 6 morphological types here with a formula of 8M+16Sm. Four chromosomes have a secondary constriction. Figure 15 (6).

*T. ludwigiana* Harv. 2n=24. There are also 6 morphological types in this variety. These are given by the formula 12M+8Sm+4St. There are 4 chromosomes which have a secondary constriction. Figure 13 (2).

*T. violacea* Harv. 2n=12. There are 6 morphological types here with a formula of 8M+2Sm+2St. There are 2 chromosomes with a secondary constriction. Figure 16 (7).

*T. violacea* var. ''Silverlace.'' 2n=12. There are 6 types represented by this variety which has a formula of 6M+4Sm+2St. There are 2 chromosomes with a secondary constriction. Figure 16 (8).

*T.* sp. Dyer no. 2042. 2n=12. There are 6 types in this taxon with a formula of 8M+2Sm+2St. There are 4 chromosomes with a secondary constriction. Figure 17 (9).

*T.* sp. Dyer no. 1851. 2n=12. There are 6 morphological types in this taxon. They have a formula of 6M+4Sm+2St. There are 4 chromosomes with a secondary constriction. Figure 17 (10).

*T.* sp. Dyer no. 5076. 2n=12. The chromosomes of this taxon represent an unusual situation. There are 2 different karyotypes, each with 7 morphological types of chromosomes. The first—Figure 18 (11)—has

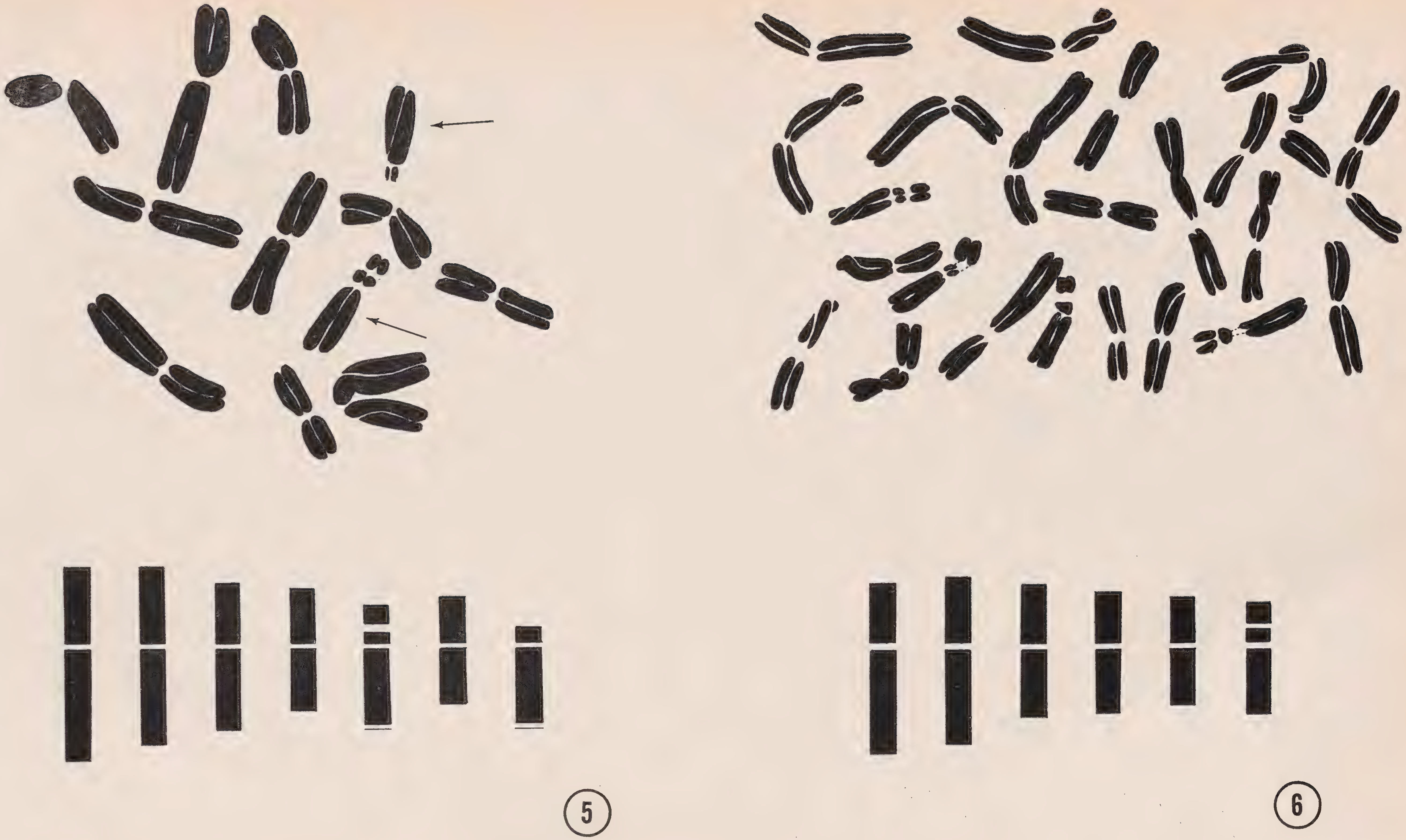

Fig. 15. Chromosomes of *Tulbaghia*: (5) *T. leucantha,* 2n=12; arrows indicate the heteromorphic chromosomes. In the idiogram these chromosomes are underlined.

(6) *T. leucantha,* 2n=24; a suspected autopolyploid form of the 2n=12 taxon. The chromosome with the very short arm in (5) is not represented in this tetraploid form.

a formula of 6M+6Sm. There is 1 chromosome with a secondary constriction and 1 with 2 secondary constrictions. The other taxon (Figure 18—12) has a formula of 7M+5Sm. There are 2 chromesomes which have a secondary constriction.

*T.* sp. Dyer no. 469S. 2n+24. The chromosomes are of 6 morphological types in this taxon. The formula is 11M+10Sm+3St. No chromosomes with a secondary constriction have been noted. Figure 19 (13).

Table 4. Unreported chromosome numbers of **Tulbaghia.**

| Species | Source | 2n |
|---|---|---|
| **T. alliacea** | Dr. Walter Lewis<br>South Rhodesia | 12 |
| **T. ludwigiana** | Dr. R. A. Dyer<br>Pretoria, South Africa | 24 |
| **T. leucantha** | Dr. R. A. Dyer<br>Pretoria, South Africa | 12 |
| **T. leucantha** | Dr. Walter Lewis<br>South Rhodesia | 24 |
| **T. violacea** var. "Silverlace" | Oakhurst Gardens<br>Arcadia, California | 12 |

## DISCUSSION

*Basic numbers in the Agapantheae.* The report of Riley and Mukerjee (1962) on the chromosome numbers in *Agapanthus* and the studies of *Tulbaghia* carried out here lead to agreement with Darlington and Wylie's (1955) suggested basic numbers of 15 for *Agapanthus* and 6 for *Tulbaghia.* Of the 12 taxa of *Tulbaghia* studied here, there is none whose 2n number is not ultimately reducible to 6. Riley and Mukerjee (l.c.) studied 7 taxa of *Agapanthus* and of these 4 have diploid numbers which may be derived from a base of 15. (Table 2). Two other taxa have a diploid number of 32 and 1 has a diploid number of 29. Such numbers are not damaging to the idea of a basic number of 15 for the genus. Darlington (1937) has postulated how unequal translocations can lead to the loss or gain of a chromosome, thus changing the number of the basic set. His ideas have been confirmed by the reports of Tobgy (1943) in his studies of the genus *Crepis.* It cannot be categorically stated that such an aneuploid alteration is the case in *Agapanthus* because no meiotic studies of species hybrids have been carried out. However, the assumption is not an improbable one.

*Evolution within the tribe.* The evidence obtained from chromosome numbers and morphology indicates that *Tulbaghia* is probably not in a euploid series with *Agapanthus.* Since change in chromosome number by ploidy is irreversible, in any euploid series, the most primitive members are those with the lowest chromosome numbers. The morphologically more primitive *Agapanthus* has higher chromosome numbers (2n: 29, 30, 32) than the more morphologically advanced *Tulbaghia* (2n: 12, 24).

*Chromosomes of Tulbaghia taxa.* The status of *Tulbaghia ludwigiana* Harv. is not clear in the literature. Harvey (1837) described the taxon and gave it specific status but Baker (1896) regarded it as a

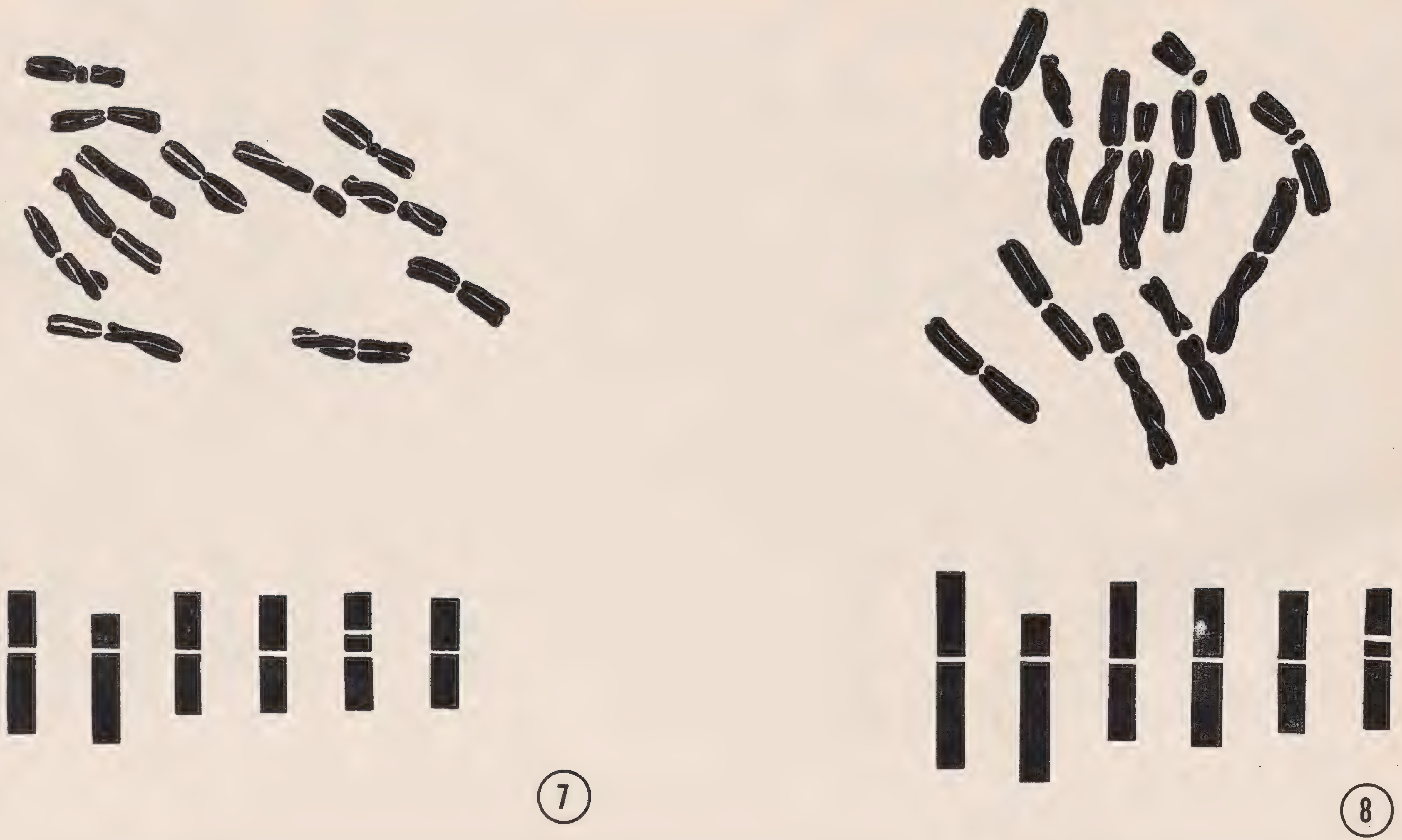

Fig. 16. Chromosomes of *Tulbaghia*: (7) *T. violacea*, 2n=12; and (8) *T. violacea* var. 'Silverlace', 2n=12.

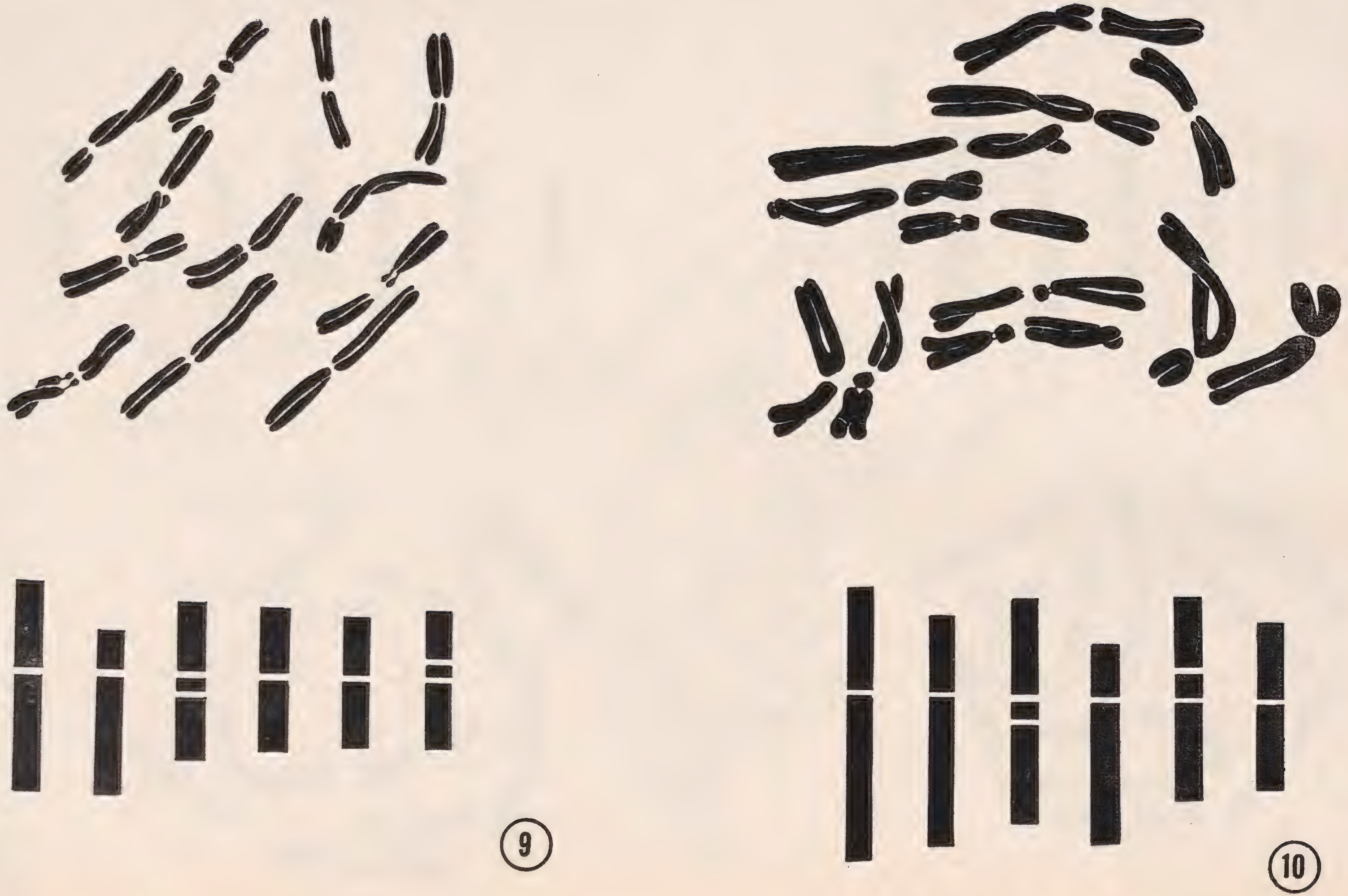

Fig. 17. Chromosomes of *Tulbaghia*: (9) *T.* sp. Dyer no. 2052, 2n=12; and (10) *T.* sp. Dyer no. 1951, 2n=12.

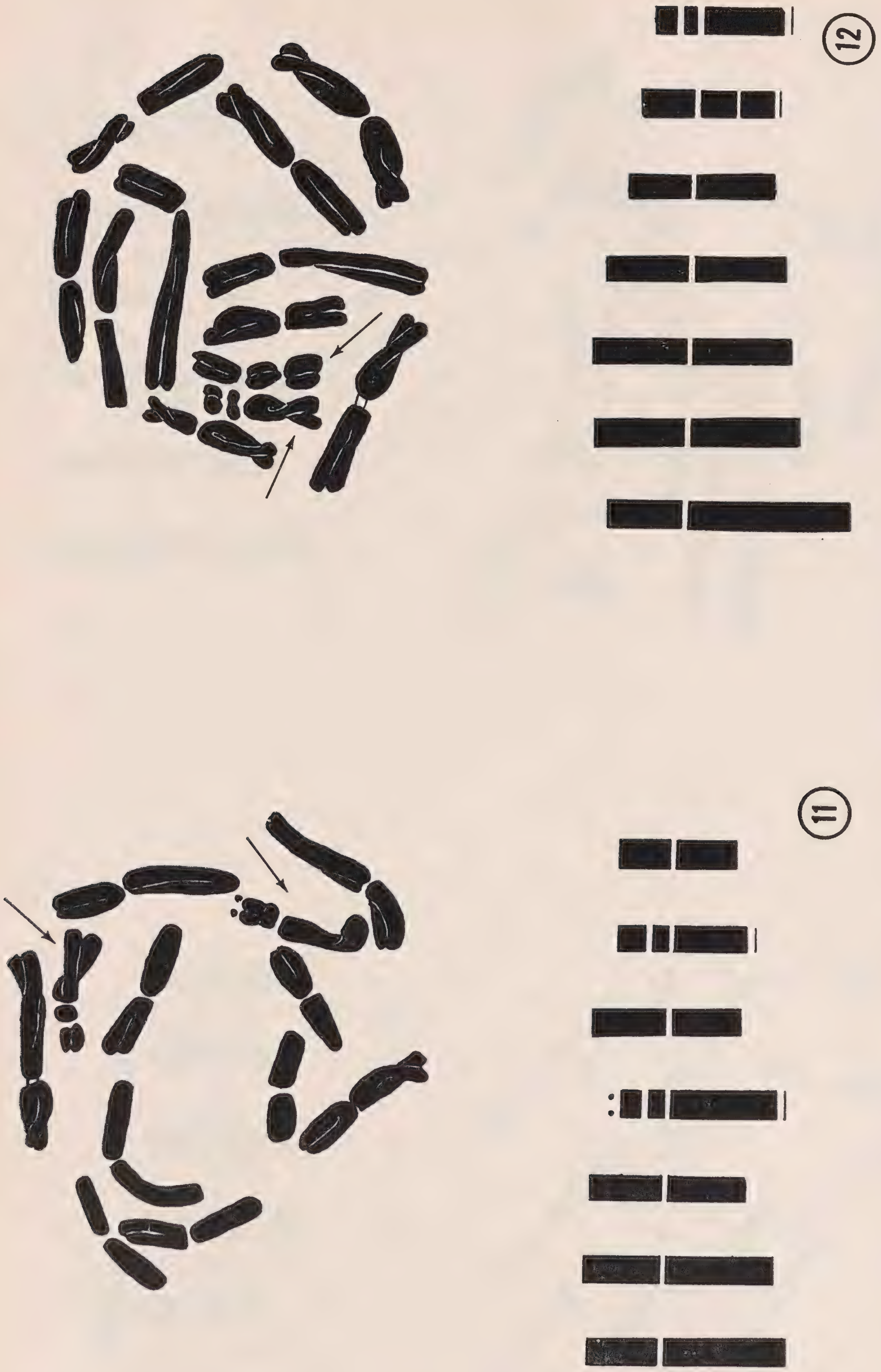

Fig. 18. Chromosomes of *Tulbaghia*: (11 and 12) *T.* sp. Dyer no. 5076, 2n=12. Heteromorphic chromosomes are indicated by arrows and underlined in the idiogram. Possibly 2 chromosome races are present here.

variety of *T. alliacea.* The diploid number in *T. ludwigiana* is 24 and there are 6 morphological types of chromosomes, each represented 4 times in the karyotype (Figure 13—2). *T. alliacea* (Figure 13-1) has only 12 chromosomes in the diploid complement but there are proportionately the same number of medianly, submedianly and subterminally constricted chromosomes in both the diploid and the tetraploid. The geographical distribution of the two taxa coincide and it is therefore possible that *T. ludwigiana* has been derived from *T. alliacea.* If that is the case. there is a discrepancy in the number of chromosomes with secondary constrictions in *T. ludwigiana.*

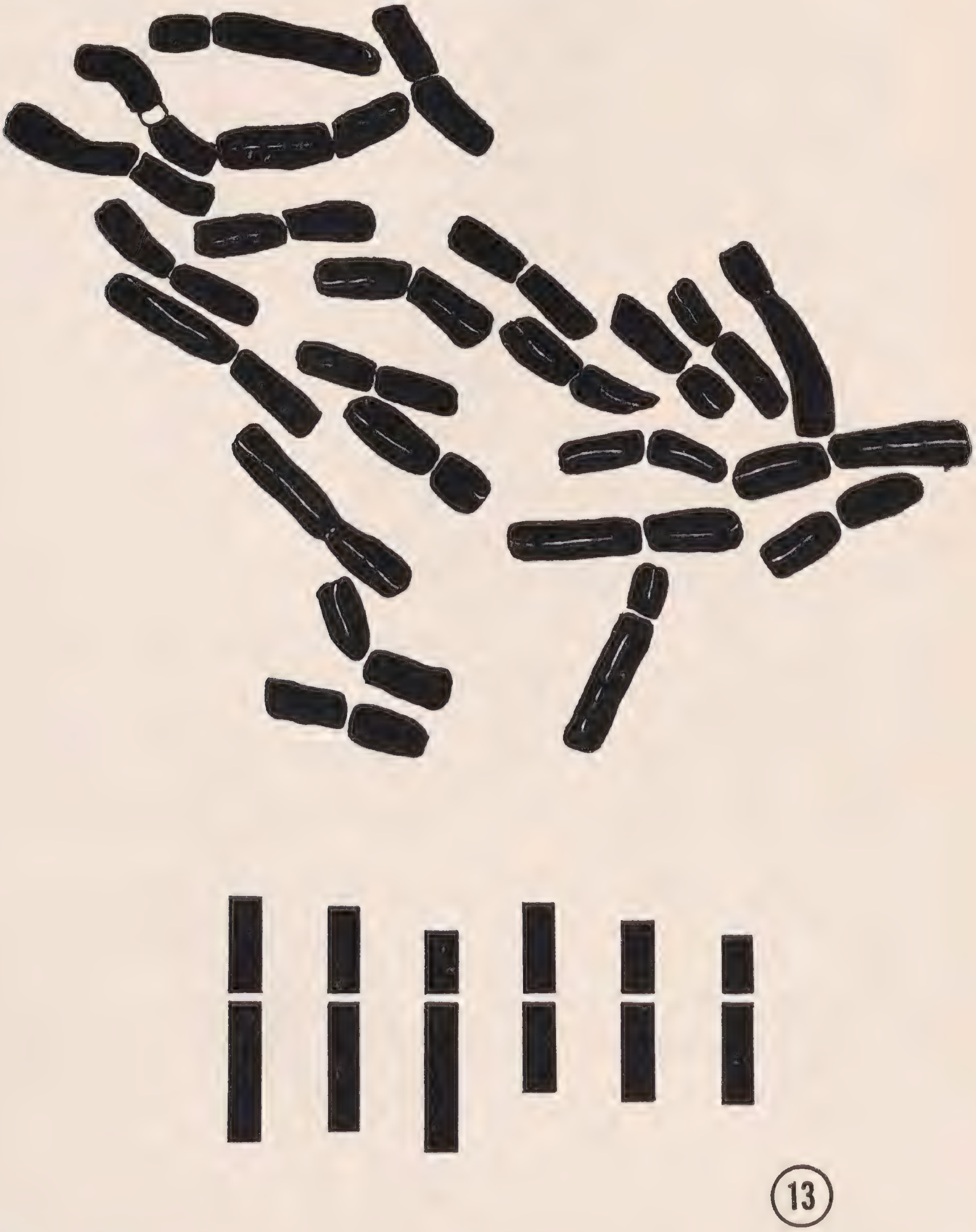

Fig. 19. Chromosomes of *Tulbaghia*: (13) *T.* sp. Dyer no. 4695, $2n=24$. The chromosomes have no secondary constrictions and few subterminal centromeres.

However, there is evidence that the number of satellite chromosomes is a most unreliable indication of ploidy (Stebbins, 1950). The possibility that *T. ludwigiana* might have been derived from some other taxa and is an allopolyploid cannot be ruled out since the chromosome morphology of the other taxa of *Tulbaghia* studied here is quite similar. The fact that there are distinct morphological differences between *T. alliacea* and *T. ludwigiana,* as well as cytological differences, indicates that the latter might be deserving of specific status.

There are two levels of ploidy represented by *T. leucantha* (Figs. 5 and 6). Members of this taxa from South Africa have a 2n number of 12 and those from South Rhodesia have a 2n number of 24. There do not seem to be any significant morphological differences between the two taxa and the fact that they have different chromosome numbers does not seem to warrant their separation into different species at the present time.

The chromosomes of *Tulbaghia* sp. 5076 (Figs. 17-10 & 18-11) are quite distinct. Unfortunately, the material from which these drawings were made is no longer available and morphological data was not taken. If the plants are of the same species, there are 2 distinct chromosome races present and meiotic studies of crosses between the 2 races would provide valuable information as to their origin.

Sharma (1956) reports variation nuclei in *Tulbaghia violacea* with numbers of 6 and 24. He postulates that such aberrant forms may eventually give rise to new species in plants which are vegetatively propagated. These observations were not confirmed in this study.

An unusual feature of the chromosome morphology of the tribe is concerned with secondary constrictions. Sato (1942) reports that 2 chromosomes in the diploid complement of *Agapanthus umbellatus* have secondary constrictions. Mookerjea (1955) reports 10 chromosomes with secondary constrictions in the same species. The 1962 work of Riley and Mukerjee in *Aganpanthus* records no chromosomes with secondary constrictions as having been observed either in *A. umbellatus* or any other taxon of the genus. By referring to Figures 13-19, it may be seen that in every species of *Tulbaghia* investigated here (with the exception of *T.* sp. 469S) there are chromosomes with secondary constrictions.

Stebbins (1950) reports that very little is known about the evolutionary changes in satellites, but that they may be either lost or gained during evolution. Since the chromosomes of *Agapanthus* have few or no secondary constrictions, while the morphologically closely related *Tulbaghia* has secondarily constricted chromosomes in almost every species, this general problem seems deserving of still further investigation.

## SUMMARY

Previously unreported chromosome numbers are presented for 5 taxa of *Tulbaghia,* including two species not heretofore studied cytologically.

Detailed chromosome drawings and idiograms are included here for *Tulbaghia* species: *alliacea, cepacea, fragrans, leucantha* (both 2n and

4n forms), *ludwigiana* and *violacea*, as well as for a variegated form of the latter. In addition drawings and idiograms are presented for the chromosomes of 4 as yet unidentified taxa of *Tulbaghia*. Chromosomes are characterized by being long and often distinctive. One or two pairs of chromosomes with distinctive secondary constrictions are features of the complements of all but one of the taxa studied.

The data are considered in relationship to the phylogenetic position of *Tulbaghia*, and its relationship to *Agapanthus*, with the need for still further study of this general problem being pointed out.

## BIBLIOGRAPHY

Baker, J. G. 1896-97. (in Thiselton-Dyer). Flora Capensis. Vol. 6. L. Reeve & Co., London.

Bentham, G. and J. D. Hooker. 1883. Genera plantarum. Vol. 3. L. Reeve & Co., London.

Darlington, C. D. 1933. Meiosis in *Agapanthus* and *Kniphofia*. Cytologia 4:229-240.

—— 1937. Recent advances in cytology. Blakiston, Philadelphia. 671 p.

Darlington, C. D. and L. F. LaCour. 1960. The handling of chromosomes. George Allen & Unwin. London. 248 p.

Darlington, C. D. and A. P. Wylie. 1955. Chromosome atlas of flowering plants. George Allen & Unwin. London. p. 351-383.

Engler, A. and K. Prantl. 1930. Die naturalichen pflanzenfamilien. Band. 15a. Leipzig. p. 317-318.

Flagg, R. O. 1961. Prolonged storage of Feulgen preparations in water. Stain Techn. 36:95-97.

Flory, W. S., Jr. 1955. The somatic chromosomes of *Tulbaghia*. (Abstr.) Virginia Jour. Sci. 6:249.

Harvey, W. H. 1837. Curtis's Botanical Magazine. 64:3547.

Hutchinson, J. 1959. The families of flowering plants. Clarendon Press. Oxford. 2v. 792 p.

Index Kewensis. 1885-1955. London.

Mookerjea, Archana. 1955. Cytology of amaryllids as an aid to the understanding of evolution. Caryologia 7:1-71.

Riley, H. P. and V. J. Hoff. 1958. Spontaneous chromosome breakage in *Tulbaghia violacea*. Proc. First Cong. So. Af. Genet. Soc. (Publ. Univ. Pretoria, New Series, No. 7): 57-60.

Riley, H. P. and D. Mukerjee. 1962. Chromosomes of some species of *Agapanthus*. Cytologia 27:325-332.

Sato, D. 1942. Karyotype alteration and phylogeny in Liliaceae and allied families. Jap. Jour. Bot. 12:57-161.

Sharma, A. K. 1956. A new concept of means of speciation in plants. Caryologia 9:93-130.

Sharma, A. K. and A. Sharma. 1961. Cytology of some species of Liliaceae. Genetica Iberica 13:25-42.

Stebbins, G. L. 1950. Variation and evolution in plants. Columbia Univ. Press, New York. 643 p.

Swanson, C. T. 1957. Cytology and cytogenetics. Prentice-Hall, Inc., New Jersey. 596 p.

Tobgy, H. A. 1943. A cytological study of *Crepis fuliginosa, C. neglecta,* and their $F_1$ hybrid, and its bearing on the mechanism of phylogenetic reduction in chromosome number. Jour. Genet. 45:67-111.

Traub, H. P. 1963. The genera of Amaryllidaceae. American Plant Life Society La Jolla, California. 85 pp.

Warmke, H. E. 1941. Chromosome continuity and individuality. Cold Spring Harbor Symp. Quant. Biol. 9:1-6.

Whitaker, T. W. and W. S. Flory, Jr. 1955. *Tulbaghia violacea*—description, cultural and cytological observations. Plant Life 11:65-67.

# ON THE KARYOLOGY AND PHYLOGENY OF SOME GENERA OF THE AMARYLLIDACEAE

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Quite a number of authors, e.g. Taylor (1925), Sato (1942), Gouws (1949), Mookerjea (1955), Sharma and Ball (1956), Ising (1962) and Wilsenach (1963), have investigated members of the family *Amaryllidaceae* cytologically. At least some species of most of the genera have already been studied, and of the South African representatives only *Hessea, Strumaria, Gethyllis, Klingia* and *Apodolirion* are still cytologically unknown. In the present study one species of each genus is investigated cytologically and idiograms are compared. This information is correlated with morphological data and some suggestions are made about phylogeny of the genera concerned.

## MATERIAL AND METHODS

The species were collected in their natural habitat and transplanted into a sandy loam in 4 inch pots. The root tips of *Hessea* and *Strumaria* were fixed in Craf (Randolph, 1935) for 24 hours and embedded in wax. Sections were cut 16—18 microns thick, and were stained in crystal violet, using the method of Smith (1934). The root tips of the other three genera were fixed in 3 alcohol: 1 acetic acid for about 30 minutes and were then macerated in a mixture of equal volumes of concentrated hydrochloric acid and 95% alcohol. The cells were subsequently hardened in a 6:3:1 solution of acetic acid, alcohol and chloroform, and the squashes were stained in acetocarmine, making them semi-permanent by sealing the edges of the coverslips with nail varnish.

When the idiograms are compared, it must be remembered that chromosomes after acetic-alcohol fixation are about 25% longer than after Craf fixation (see Wilsenach, 1963). The rather great difference in chromosome length between *Hessea* and *Strumaria* chromosomes on the one hand, and those of *Gethyllis, Klingia* and *Apodolirion* on the other hand, is partly due to the differences in the methods of fixation.

## RESULTS

The chromosomes are described as V-, L- and f-shaped depending on the position of the primary constriction: V for a median constriction or one nearly so, L for submedian and f for a subterminal constriction, i.e. where the proximal arm is less than a third of the length of the distal arm. Although the primary constrictions were very clear, especially after acetic-alcohol fixation, the secondary constrictions could not be seen in any of the material investigated. The chromosomes are arbitrarily divided into long (l), medium (m) and short (b, brevis). This system was also used by Gouws (1949), and Wilsenach (1963), and is used here to facilitate comparison with these results.

At least three metaphase plates of each species were investigated in order to determine chromosome number and to compute the idiograms (see Figs. 20 and 21).

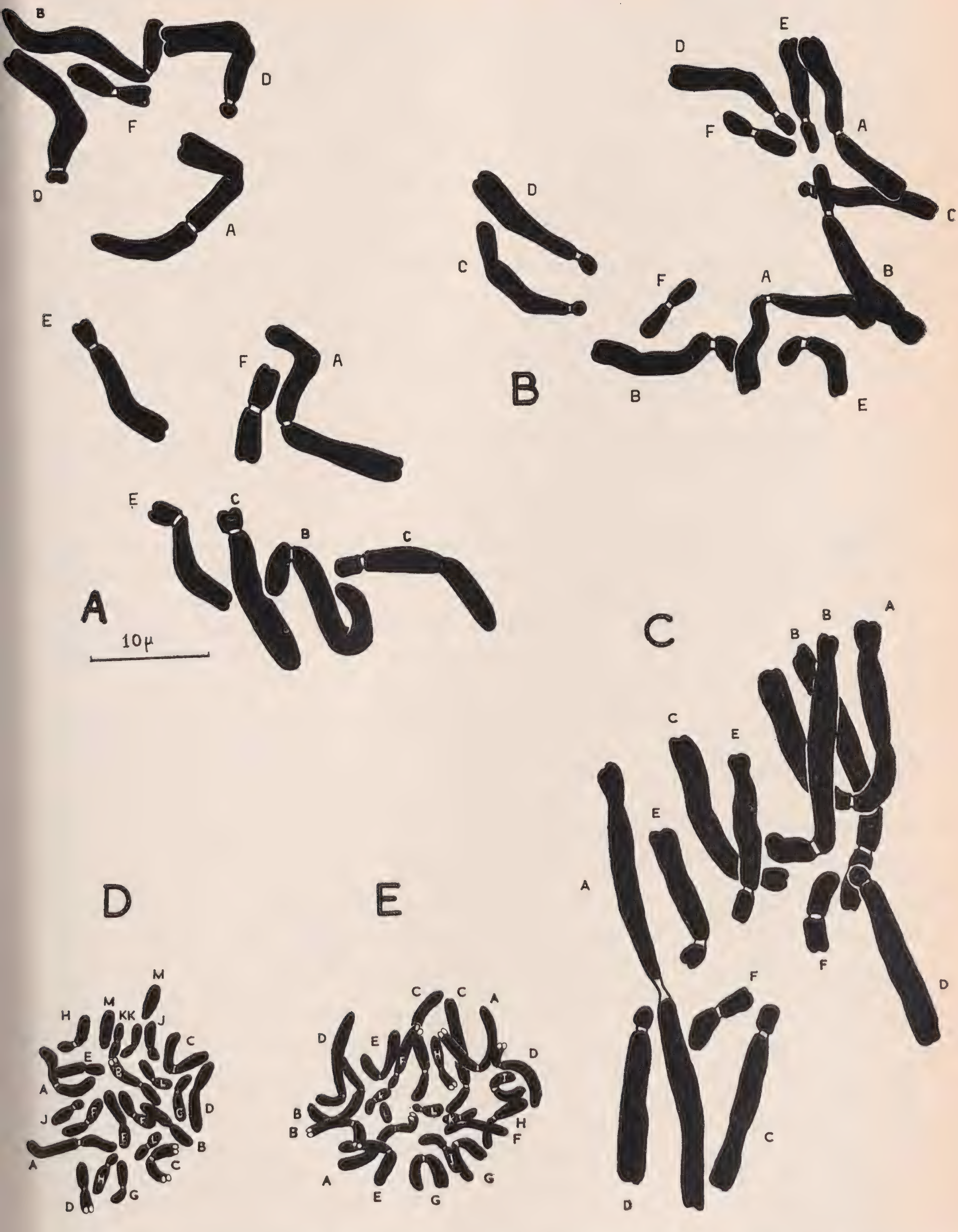

Fig. 20. Chromosome morphology in the species *Gethyllis afra* (A), *Klingia namaquensis* (B), *Apodolirion buchananii* (C), *Hessea zeyheri* (D), and *Strumaria truncata* (E).

A. *Gethyllis afra* Linn. *2n=12.*
Genome formula:— 1 (one) 1 V; 1 (one) 1 f; 2 mf;
1 (one) mL; 1 (one) b V.
The longest chromosome is 21 microns long, the shortest 7.5 microns.

B. *Klingia namaquensis* Schoenl. *2n=12.*
Genome formula:— 1 (one) 1 V; 1 (one) 1 f; 3 mf;
1 (one) b V.
Chromosome A is 23 microns long, the shortest chromosome has a length of 7.5 microns.

C. *Apodolirion buchanani* Baker *2n=12*
Genome formula:— 1 (one) 1 V; 1 (one) 1 f; 3 mf;
1 (one) b V.
Chromosome A: 31 microns; Chromosome F: 7 microns.

D. *Hessea zeyheri* Baker *2n=24*
Genome formula:— 1 (one) 1 V; 1 (one) 1 L; 2 mV; 3 mL;
2 b L; 2 b V; 1 (one) bf.
Longest chromosome 9 microns long, shortest one plus or minus 3 microns.

E. *Strumaria truncata* Jacq. *2n=22*
Genome formula:— 1 (one) 1 L; 4 mL; 1 (one) mf; 2 mV;
1 (one) bL; 1 (one) b V; 1 (one) bf.
The longest chromosome is 12 microns long, the shortest has a length of less than 5 microns.

## DISCUSSION

Most authorities agree that the family *Amaryllidaceae* is derived from the *Liliaceae.* In the *Liliaceae* many chromosome numbers have been reported, but 2n=24 is a common one (e.g. *Fritillaria, Lilium, Notholirion* and *Tulipa*). Very few have 2n=12 (e.g. *Kniphofia* and *Ornithogalum*), but it is possible to consider 2n=12 as the original basic number, and to consider 2n=24 as the result of polyploidy.

*Tulbaghia* has an umbellate inflorescence but superior ovary and can be considered as a link between the two families. It is characterised by 12 somatic chromosomes (Whitaker and Flory, 1955).

It is interesting to note that *Gethyllis, Klingia* and *Apodolirion* also have 12 somatic chromosomes and it is suggested here that this represent the original basic chromosome number for the *Amaryllidaceae. Zephyranthes,* too, has been reported as having 6 as the haploid number, but in this genus polyploid species also occur (Sato, 1938; Sharma & Ghosh, 1954). It is interesting to note that Hutchinson (1959) has grouped *Gethyllis and Apodolirion* and *Zephyranthes* in one tribe, the *Zephyrantheae,* and this classification is supported here by cytological data. Unfortunately Hutchinson (1959) separated these genera from *Klingia,* which he put into a completely different tribe. If the idiograms of *Gethyllis, Apodolirion* and *Klingia* are compared one notices that they are so similar that it seems unreasonable to separate these genera into different tribes. It is suggested here that Hutchinson's scheme is unnatural in this aspect, and that *Klingia* also should be included in the *Zephyrantheae.* This tribe is by no means primitive, but it is considered here as having retained the original basic number (6) of the family.

Hutchinson (1959) as well as Pax & Hoffman (1930) group the genera *Hessea* and *Strumaria* in the *Haemantheae* (or *Haemanthinae*), which separates them completely from the genus *Nerine*. That the genus *Hessea* is closely related to the genus *Nerine* can be demonstrated as follows: The karyotype of *Hessea zeyheri* is remarkably similar to that of *Nerine filifolia* (for karyotype of latter see Gouws, 1949). Not only does this indicate the affinity of the two genera, but *N. rehmannii* has long been regarded as a plant belonging to the genus *Hessea*, until Bolus (1930) demonstrated that in this plant the anthers are basifixed. Another distinguishing character is that the stamens in *Hessea* are spread, but this is not unknown amongst the *Nerines*. It is therefore suggested that *Hessea* be included with *Nerine* in the same tribe and not the *Haemantheae* (or *Haemanthinae*) as proposed by Hutchinson. A study of the karyotype of *Strumaria* likewise suggests that this genus also should be here included. Morphologically and karyologically *Strumaria* and *Hessea* appear to be closely related. Obermeyer (1963) expressed doubt as to whether they should be considered as two distinct genera.

Basing his ideas on karyological and morphological data, Gouws (1949) included the following genera in the one tribe: *Boöphone* ($2n=22$). *Nerine* ($2n=24$, 22,), *Brunsvigia* ($2n=22$). Amaryllis ($2n=22$), *Crinum* ($2n=22$), *Ammocharis* ($2n=22$), and *Cybistetes* ($2n=22$). If *Hessea* and *Strumaria* are added to this tribe (Amaryllideae) the following picture emerges: The primitive genera having free perianth segments or a short perianth tube have 22 or 24 chromosomes, and the members which are more advanced (with a distinct perianth tube) have 22 chromosomes.

In the earlier discussion $2n=24$ was explained in terms of polyploidy from a $2n=12$ ancestor. If this interpretation is accepted the origin of the tribe Amaryllideae involved polyploidy from $2n=12$ stock, while the species and genera with 22 somatic chromosomes arose by loss of a pair of chromosomes.

Pax and Hoffman (1930), when discussing the anatomy of the peduncle of the Amaryllidaceae, pointed out that two types occur: In some the ground tissue is wholly composed of parenchyma, in others a definite ring of sclerenchyma tissue occurs. They noticed that some genera were characterized by the sclerenchyma ring even though the flowers were small or few, and in other genera many big flowers were borne on an axis without sclerenchyma. They came to the conclusion that the presence of the sclerenchyma could not be explained on the basis of mechanical function, and suggested that it may be a character of some phylogenetic importance. All the amaryllid genera were not available to Pax and Hoffman for peduncle studies, and when the peduncles of the South African representatives were investigated by the present author, it was very interesting to note that all the genera which had sclerenchymatous peduncles are grouped together in the tribe Amaryllideae as suggested above.

The genera lacking sclerenchyma are *Haemanthus, Clivia, Cryptostephanus* and *Cyrtanthus* (including the genera *Anoiganthus* and *Vallota*). The possibility that these genera belong to one tribe, the

***Haemantheae,*** can also be supported on cytological grounds, but their relationships are not discussed in this paper.

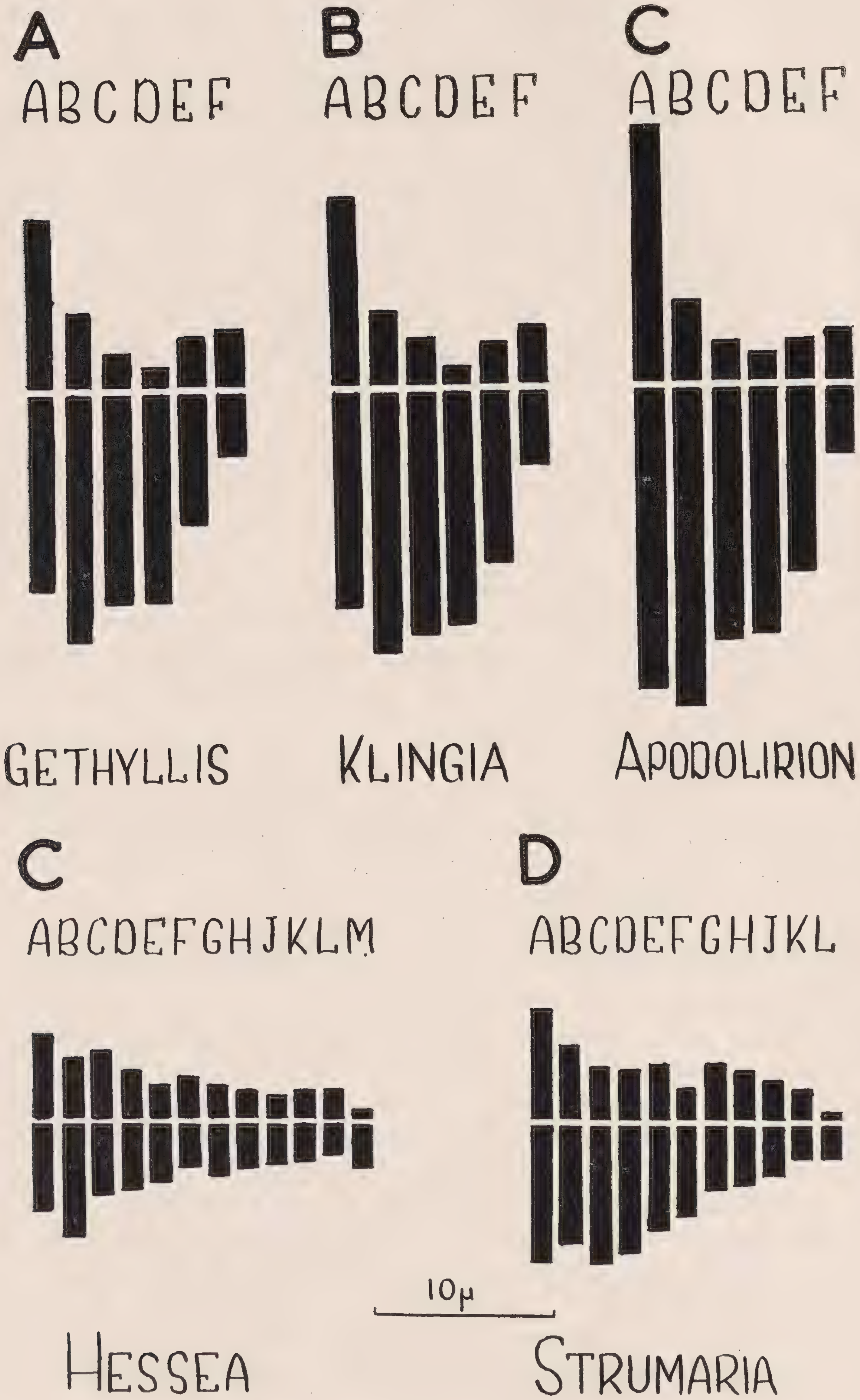

Fig. 21. Idiograms for the species (upper) *Gethyllis afra* (A), *Klingia namaquensis* (B), *Apodolirion buchananii* (C), and (lower) *Hessea zeyneri* (C), and *Strumaria truncata* (D).

## A NEW CONCEPT FOR THE GENUS GETHYLLIS (SEE FIG. 21.)

Different *Gethyllis* species show great variation as regards their stamens (the number varies from six to many and the anthers per stamen vary from two to five). *Klingia* is considered as being distinct from *Gethyllis* because three filaments in *Klingia* widen out to form a staminal cup. *Apodolirion* is maintained as a separate genus because the stamens occur in two series whereas they occur in only one series in *Gethyllis.* It almost seems anomalous to maintain three genera on the basis of stamen characters and to accept at the same time that the stamens of one of the genera are quite variable.

It is interesting to compare the above differences with variation which has been demonstrated to occur within another amaryllid genus, *Cyrtanthus. Cyrtanthus herrei* was formerly considered as belonging to the genus *Cryptostephanus* on the basis of a staminal cup which is formed by fused filaments. Dyer (1959) combined this species with *Cyrtanthus* (in which no staminal cup is normally present) and suggested that such variation could occur within one genus. His decision was supported by subsequent karyological data (Wilsenach, 1963). The difference on which *Klingia* and *Gethyllis* are separated has therefore been demonstrated to occur *within* another amaryllid genus.

In *Cyrtanthus* species occur in which the stamens are in one series, other species have stamens in two series, and it is not disputed that they belong to one genus. It is inconsistent to separate two other genera (*Gethyllis* and *Apodolirion*) on this basis only.

When the idiograms of *Klingia*, *Gethyllis* and *Apodolirion* are compared one notices remarkable similarity: In all three chromosome A is V-shaped; chromosome B has the longest distal arm; chromosomes C and D have distal arms of the same length; chromosome D has the shortest proximal arm and the shortest chromosome is V-shaped; chromosome E is the only one showing a little variation, in that the centromere is a little further away from the one end in *Gethyllis* than in the other two genera. These idiograms show much less variation than is commonly seen within a genus in the *Amaryllidaceae* (see e.g. Wilsenach, 1963).

From the above it should be clear that *Gethyllis*, *Apodolirion* and *Klingia* are maintained as separate genera for very debatable reasons. The great karyological similarity of these three genera is a strong indication that they belong to one genus, and it is suggested here that they should be merged into one genus, namely *Gethyllis*, which was described first. All that is involved is to describe the androecium of the genus as follows:

*Stamens from six to many, usually occurring in one series, rarely in two series; filaments may widen to form a staminal cup; two to five anthers per stamen, anthers basified, linear and often twisted or curved.*

## SUMMARY

The Karyotypes were studied and the following chromosome numbers were reported: *Gethyllis afra*, 2n=12; *Klingia namaquensis*, 2n=12; *Apodolirion buchanani*, 2n=12; *Hessea zeyheri*, 2n=24; *Stru-*

*maria truncata*, 2n=22. It was suggested that *Klingia* and *Apodolirion* are congeneric with *Gethyllis*, and that this genus should be included in the tribe Zephyrantheae. The genera *Hessea* and *Strumaria* are closely related to *Nerine* and it was proposed that they should be included in the tribe *Amaryllideae*. The origin of this tribe was considered to involve polyploidy from a 2n=12 ancestor. The diploid number of 12 (or x=6) was suggested as the original chromosome number of the *Amaryllidaceae*, and this number has been retained in the tribe *Zephyrantheae*.

### LITERATURE CITED

Bolus, L. 1930. in S. Afr. Gard. *20*:148.

Dyer, R. A. 1959. *Cyrtanthus herrei*. Fl. Plts. of Afr. *33*:1281.

Gouws, J. B. 1949. Karyology of some South African Amaryllidaceae. Plant Life *5*:54-81.

Hutchinson, J. 1959. The families of flowering plants. 2nd Ed. Oxf. at the Clarendon Press.

Ising, G. 1962. Chromosome balance in Cyrtanthus. Plant Life *18*:95-128.

Mookerjea, A. 1955. Cytology of amaryllids as an aid to the understanding of evolution. Caryologia *7*:1-71.

Obermeyer, A. A. 1963. *Hessea tenella*. Fl. Plts. of Afr. *36*:1413.

Pax, F. and Hoffman, K. 1930. Amaryllidaceae Engler and Prantl Nat. Pflzfam. 2nd Ed. *15a*:391-430.

Randolph, L. F. 1935. A new fixing fluid and a revised schedule for paraffin method in plant cytology. Stain Technol. *10*:95-96.

Sato, D. 1938. Karyotype alternation and phylogeny. IV. Karyotypes in Amaryllidaceae with special reference to SAT-Chromosomes. Cytologia *9*:208-242.

——. 1942. Karyotype alternation and phylogeny in Liliaceae and related families. Jap. Jour. Bot. *12*:57-161.

Sharma, A. K. and Ball, A. K. 1956. A cytological study of a few genera of Amaryllidaceae with a view to finding out the basis of their phylogemy. Cytologia. *21*:329-352.

Smith, F. S. 1934. The use of picric acid gram stain in plant cytology. Stain Technol. *9*:95-96.

Taylor, W. R. 1925. The chromosome morphyology of *Veltheimia, Allium* and *Cyrtanthus*. Amer. Jour. Bot. *12*:104-115.

Whitaker, T. N. and Flory, W. S. 1955. *Tulbaghia violacea*. Plant Life *11*:65-67.

Wilsenach, R. 1963. A cytotaxonomic study of the genus *Cyrtanthus*. Cytologia *28*:170-180.

EDITORIAL NOTE.—Prof. Wilsenach did not have access to the publication, "The Genera of Amaryllidaceae" (1963) by Hamilton P. Traub. Thus in his discussions he refers only to treatments of the *Amaryllidaceae* published before 1963. Prof. Wilsenach will publish a follow-up article in the 1966 PLANT LIFE in which he will discuss his present and any additional results in relation to "The Genera of Amaryllidaceae" (Traub, 1963), and the addenda note by Hamilton P. Traub in the 1965 PLANT LIFE (pages 88-89).—*Hamilton P. Traub.*

# ADDENDA TO TRAUB'S "THE GENERA OF AMARYLLIDACEAE" (1963)

HAMILTON P. TRAUB

When the text of "The Genera of Amaryllidaceae" (Traub, 1963) was prepared the chromosome numbers of the Amaryllid genera of the

Trans-Saharan African Region (East- and West-Central, and South Africa) were minimally known, excepting for the genera *Choananthus, Gethyllis, Apodolirion, Klingia, Hessea, Carpolyza, Strumaria and Chapmanolirion.* Wilsenach (1965) in the present issue of PLANT LIFE has given a minimal report on the chromosomes of most of these genera—*Gethyllis, Apodolirion, Klingia, Hessea and Strumaria.* On the basis of this report, the following dispositions can be made:

(1) The tribe *Strumarieae,* including *Hessea, Carpolyza,* and *Strumaria,* can be merged with the tribe *Crineae* (see Table 1.).

(2) Chromosome evidence has to be used in conjunction with morphological and other data. It is not known if Wilsenach (1965) has seen the fruit of *Klingia,* and thus this information may be missing. However, the genus *Klingia* can be placed in the tribe *Gethylleae,* along with *Gethyllis* and *Apodorlion,* tentatively (see Table 1) awaiting verification of the fruit character.

1a. Filaments free, fruit an elongated berry .......... **Gethyllis** (incl. **Apodolirion)**
1b. Filaments united below into a staminal cup, fruit unknown ........ **Klingia**

This leaves only the genera *Choananthus* and *Chapmanolirion* to be accounted for on the basis of chromosome number and morphology. The type of *Chapmanolirion* may be *Pancratium trianthum* (see Traub, 1963). If this can be verified, then it will become a synonym of *Pancratium.*

Table 1, incorporating the data reported by Wilsenach (1965) is furnished for the information of the members of the Society. Thus the missing parts of the amaryllid chromosome atlas are gradually being fiilled in.

Table 1. Chromosome numbers in **tribes** of the Amaryllidaceae containing genera native to the Trans-Saharan African Legion (East- & West-Central and South Africa.)

Tribe ALLIEAE, x=5, 6, 7, 8, 9, 10, 13?
Subtribe 1. ALLINAE, x=6, 7, 8, 9, 10
**Allium** 2n=14, 16, 18, 24, 28, 32, 40; (cosmopolitan in No. Hemisphere to Mexico and No. Afr.)
**Nectaroscordum** 2n=16 (E. Asia)
**Caloscordum** 2n=16 (E. Asia)
**Steinmannia** 2n=? (So. Amer.)
**Nothoscordum** 2n=16, 18, 24 (No. Amer. and So. Amer.)
**Leucocoryne** 2n=18 (So. Amer.)
**Tulbaghia** 2n=12, 24 (So. Afr.)
**Stemmatium** 2n=? (So. Amer.)
**Tristagma** 2n=12 (So. Amer.)
Subtribe 2. BRODAEINAE, x=5, 6, 7, 8, 9 (No. Amer.)
Subtribe 3. MILLINAE, x=13? (No. Amer.)
Tribe AGAPANTHEAE, x=15 **(So. Afr.)**
Tribe CRINEAE, x=6, 11 (including tribe Strumarieae)
**Ammocharis** 2n=22 (So. Afr.)
**Crinum** 2n=22, 22+2B, c.72 (cosmopolitan No. & So. tropical and adjacent temperate zones)
**X Crinodonna** 2n=? (bigeneric hybrid)
**Nerine** 2n=22, 24 (So. Afr.)
**Hessea** 2n=24 (So. Afr.)
**Strumaria** 2n=22 (So. Afr.) (including **Carpolyza)**
**X Brunserine** 2n=? (bigeneric hybrid)
**Boophone** 2n=22 (So. Afr.)
**Cybistetes** 2n=22 (So. Afr.)
**Brunsvigia** 2n=22 (So. Afr.)
Tribe GETHYLLEAE, x=6
**Gethyllis** 2n=12 (incl. **Apodolirion)** (So. Afr.)
**Klingia** 2n=12 (So. Afr.)
Tribe HAEMANTHEAE x=8, 9
**Haemanthus** 2n=16, 18 (E. Cent. So. Afr.)
**Choananthus 2n=?** (E. Cent. Afr.)
Tribe CLIVIEAE, x=6, 11
**Clivia** 2n=22 (So. Afr.)
**Cryptostephanus** 2n=24 (So. Afr.)
Tribe CYRTANTHEAE, x=8, 11
**Anoiganthus** 2n=16 (So. Afr.)
**Cyrtanthus** 2n=16, 22 (incl. Vallota) (So. Afr.)
Tribe PANCRATIEAE x=11
**Vagaria** 2n=? (Asia Minor)
**Pancratium** 2n=22, 44 (Canary Is., Medit. Region to India and So. Afr.)
**Chapmanolirion** 2n=? (So. Afr.)

## LITERATURE CITED

Traub, Hamilton P. The Genera of Amaryllidaceae. 1963
Wilsenach, R. On the karyology and phylogeny of some genera of the Amaryllidaceae. Plant Life 21: 82-88. 1965

# NOTHOSCORDUM—THE UBIQUITOUS AMERICAN

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The Bible teaches us that the meek shall inherit the earth, but surely the genus *Nothscordum* was not meant to be included in this statement, for there is really nothing meek or shy about a few notable members of this interesting genus. Both *N. bivalve* and its cousin *N. inodorum* are well equipped to inherit the earth, given the opportunity to do so, with practically no encouragement. If one judges flowers by only their impressive colors and dimensions, then *Nothoscordum* is a meek little mouse indeed, but like the mouse, it is persistent, rugged, adaptable, and quietly aggressive. This is not meant to convey to the reader that I have any lack of love for these tough little gamins, for in truth I do admire it and am rather fond of its sometime virtues. Presently at least 17 species are recognized, which are widely distributed from Ohio and Virginia Southward to the Gulf states and Westward to Texas and down into Mexico and South America. It is in South America where they are best represented, with some fifteen or so species recognized. It is hoped that the others from South America are less inclined to run rampant. None, excepting *N. inordorum* are known to be in general cultivation in the countries above the equator at this time, though no doubt a few of them would be choice garden material. Apparently Nothoscordums replace Alliums in South America, as no Alliums occur south of Central Mexico. Unlike Alliums, Nothoscordums in their vegetative parts lack the characteristic onion or garlic odor and are relatively odorless and tasteless. Indeed the word *Nothoscordum,* translated, literally means ''not a garlic''. As a group, most species are monotonously colored white, or whitish, with occasional markings of violet, yellow, or green, but there are several species said to have bright golden yellow flowers, and one species is said to be lilac colored. In general they have umbels of 2 or more flowers per scape, and some are dwarf while some are tall and wiry.

*Nothoscordum bivalve* is undoubtedly the best known member of the genus and also the most widely distributed. It grows in roughly 25% of the United States, North to Ohio and West to W. Texas. I know of no other native bulbous plant that has adapted itself to such a widely varying environment. It thrives at mile high elevations as easily as it does at sea level. Neither high humidity nor semi-arid conditions bother it. It will adapt itself to tropical conditions and will survive subzero temperatures with equal disdain. A rampant seeder, it offsets freely too, so that a single bulb can quickly become an established colony where conditions permit. In its defense, it must be stated that it is no worse than some other equally rampant spreaders such as *Orinthogalum umbellatum, Muscari* species, and many *Alliums,* to name a few of our garden favorites. What then, are its virtues, if any? True, it is pretty enough, in an unimposing way. The loosely arranged umbels of starry cream-white flowers are not at all unattractive when seen at their best.

Often they are keeled with a stripe of green, brown, or purple on their backside which adds a bit of color to the individual flowers. These little stars are each about ¾″ across the face, and the anthers, filaments, ovary, and base of each segment are tinged greenish-yellow, and are each carried on a pedicle from 1-2″ from the center of the umbel. The umbels may rise on stems from ten inches to two feet above the leaves. A single bulb may send forth scape, after scape, continuously from February until June, with no letup. After a brief summer of dormancy, they will flower again in the fall, until winter really sets in. Under cultivation, a few will refuse to go dormant and flower throughout the summer. Thus it is quite possible for them to flower 9-10 months of the year where climate and conditions permit. And that is not all! They are very sweetly fragrant, with perfume suggesting *Heliotrope.*

A group of *Nothoscordum bivalve* swaying on wiry stems above shiny green grassy leaves on a warm sunny afternoon in spring or fall can be a pleasant experience to the olfactory senses as their perfume is wafted through the air. I can recall pleasing moments as a child-home-from-school, sitting out in the lawn among the entrenched *Nothoscordum bivalve* colony and enjoying the pervading fragrance. What cared I if these ''wild onions'' did not belong there and were uninvited residents? The smell of them in the early evening air was delicious. I would pick handfuls of them and stick my nose into the masses of yellowish white blooms to drink deeply of the scent. The yellow pollen dusted my nose and face! Such are the joys of children. Later, as I began to acquire an interest in bulbous things, these were the first bulbs to go into my garden. I recall digging them from the lawn and leaving ugly blemishes in my wake. Mother, though patiently tolerant, was unimpressed. Thereupon I would gather a bunch of the stems for her to smell. She was agreeably surprised, but still not convinced. But even to this day, she has never been too impressed with most of my ''little bulbs'' that I grow, so it was really no reflection on my beloved Nothoscordums. Even now, when I find a person cautious to praise this plant's unpretentious qualities, I still gather a bunch of them and let them smell. It never fails. Who can fail to be charmed or delighted by a fragrant flower. To be so jaded is to miss some of life's real pleasures. The generous blooming habits, with an autumn reprise, its delicious fragrance, its modest prettiness, its zeal for living, these are its endearing qualities. Like the dog, it joyfully seems to be wagging its tail, licking our boots, and asking for nothing in return, save a pat of appreciation. Surely we can offer it a sunny nook somewhere where it can be left to colonize at the expense of no one. It should be a charter member in any garden set aside for wildings. If set deeply, to a depth of six or more inches, it need never be divided, as increased depths inhibit offsetting. Fastidious gardeners who don't allow any plants to set seed voluntarily can even plant it in a choice position. *Nothoscordum bivalve* grows everywhere in Mexico, and is said to grow into Guatemala.

*Nothoscordum inodorum* (syn.—*N. fragrans*) is a taller cousin of *N. bivalve,* of more robust growth habits, and even more sweetly scented flowers, if that can be. Though slightly less hardy, and less able to withstand dry conditions than its tough cousin, it is even more rampant a spreader, and this must be very carefully watched lest it become an unwelcome guest. Unlike *N. bivalve* which has narrow grassy leaves that are never untidy, the foliage of this larger *Nothoscordum* is much broader and longer, of a dull bluish green color, and apt to sprawl. It is for this reason that one must choose a place for it with care, so that it does not smother other smaller things, as well as choke them out with its numerous seedling offspring. If one chooses to cultivate it, all flower stems should be removed as quickly as they fade, so that it will not set seed. Its quaintly charming umbels of whitish flowers with their intense fragrance are simply not enough to offset or compensate for its numberless seedling offspring that insist on taking over every inch of adjacent garden space. It is a plant only for wild gardens. Much as I would like to do so, I cannot eulogize this plant. If *N. bivalve* is like a friendly dog, then *N. inodorum* is a dog that bites the hand that feeds it. Look out! ''Pretty is as pretty does.''

There is not much point in discussing all of the South American Nothoscordums, as they are not in cultivation, nor are they available here. No doubt there are some that are choice within the group, and fairly adaptable to our culture. It is likely that those from higher altitudes should prove fairly hardy. Uruguay seems to be the center of the *Nothoscordum* clan, with most species being found there. Others are found in Chile, Paraguay, Peru, Bolivia, and Argentina. Any discussion of these exotics should begin with those that seem most appealing as garden plants, and the yellow flowered species would be my first choice. *N. gramineum*, has many flowered umbels of yellow flowers on stems 3-6 inches tall. This one should prove easy, as it is said to grow from Argentina to Mexico. That is a lot of territory! *N. minarum* has taller stems 6-12 inches tall, but few flowered umbels of yellow flowers. It is one of the many species from Uruguay. *N. bonariense,* another yellow Uruguayan species, has slender stems with only one or two flowers, or more rarely three or four flowers, less than a foot tall. Sometimes the flowers are said to be white with brown veins.

The light lilac flowers of *N. andicola* top dainty 3-6″ stems and are a refreshing departure from the many white kinds. This Andean species seems to be wide spread in the countries of the Andean region. The white flowers of *N. gaudichadianum* with their violet veins in 3-6 flowered umbels on stems under a foot in height whet the imagination of the enthusiast collector. It too is from Uruguay. Two *Nothoscordum* species have such short stems as to be practically stemless. Both the white *N. fictile* and *N. sessile,* with their one flowered scapes must appear like starry crocuses squatting on the ground. They surely are a departure from a family which mimics the onion family. These are but a few of the species within the genus, but it will at least point out the fact that there are still many interesting plants yet to be had. Let us hope that some day these will be made available to us. We might further hope that they will not violate their welcome in the fashion of *N. inodorum.*

## BIBLIOGRAPHY

Hayward, W. *Nothoscordum bivalve.* Herbertia, p. 235. 1937.
Howard, T. M. Some Texas Amaryllids. Herbertia, pp. 121-124. 1952.
James, W. M. *Nothoscordum fragrans* (*N. inodorum*), Herbertia, p. 156. 1941.
Lawrence, Elizabeth. The Little Bulbs. pp. 178-179. 1957.
Moldenke, H. N. Amaryllid genera and species. Herbertia. 1952.
Moldenke, H. N. Amaryllid genera and species. Herbertia. 1953.
Morton, C. V. A Checklist of Amaryllidaceae, Tribe Allieae in the United States. Herbertia. pp. 68-83. 1940.
Morton, C. V. A Checklist of the Bulbous Amaryllidaceae of Mexico. Herbertia. pp. 101-108. 1954.
Traub, Hamilton P. The Genus *Nothoscordum.* Plant Life 10: 123-127. 1954.
Traub, Hamilton P. The Genera of Amaryllidaceae. Amer. Plant Life Soc. 1963. pages 34-35.
Wilder, Louise Beebe. Adventures with Hardy Bulbs. pp. 273-274. 1952.

# RECORD KEEPING BY PLANT COLLECTORS

HAMILTON P. TRAUB

Such experienced plant collectors as Mrs. Morris Clint, and Dr. T. M. Howard, keep adequate records of their plant finds, and this note is not meant for such veteran collectors. It is aimed at those who have recently entered the field and as yet do not keep adequate records. The writer has received seeds and bulbs without any definite record of the place and time of collection, or any other notations. This is most unfortunate because the scientific record is forever inadequate.

Most collectors obtain handy smaller bound memorandum books which they can carry into the field. The various lots are numbered consecutively from No. 1 upward, using one number for each lot taken in a different habitat, even if it is the same species. In this way confusion is avoided because each number will appear only once for any one collector.

After each number, he enters the date of collection, sometimes even the time of day, the name of the plant, if known, or probable (?) identity, or the space is left blank as to species, if unknown. He also enters the altitude, if known, the geographical location, the ecological conditions, soil, rainfall, etc., and notes on plant characters obtainable at the time.

When any part of the lot is sent to another person, the collection number is given with it. In this way all who work with the material can refer back to the original collection number for further details. For instance, Mrs. Clint sent the writer stock of a glaucous-leaved amaryllid, probably a *Sprekelia* (?), Clint No. 266, in 1952. When flowers were finally obtained 12 years later in 1964, it was easy to write to Mrs. Clint for more information about this lot so that the plant could be published as the new species, *Sprekelia clintiae,* in the present issue.

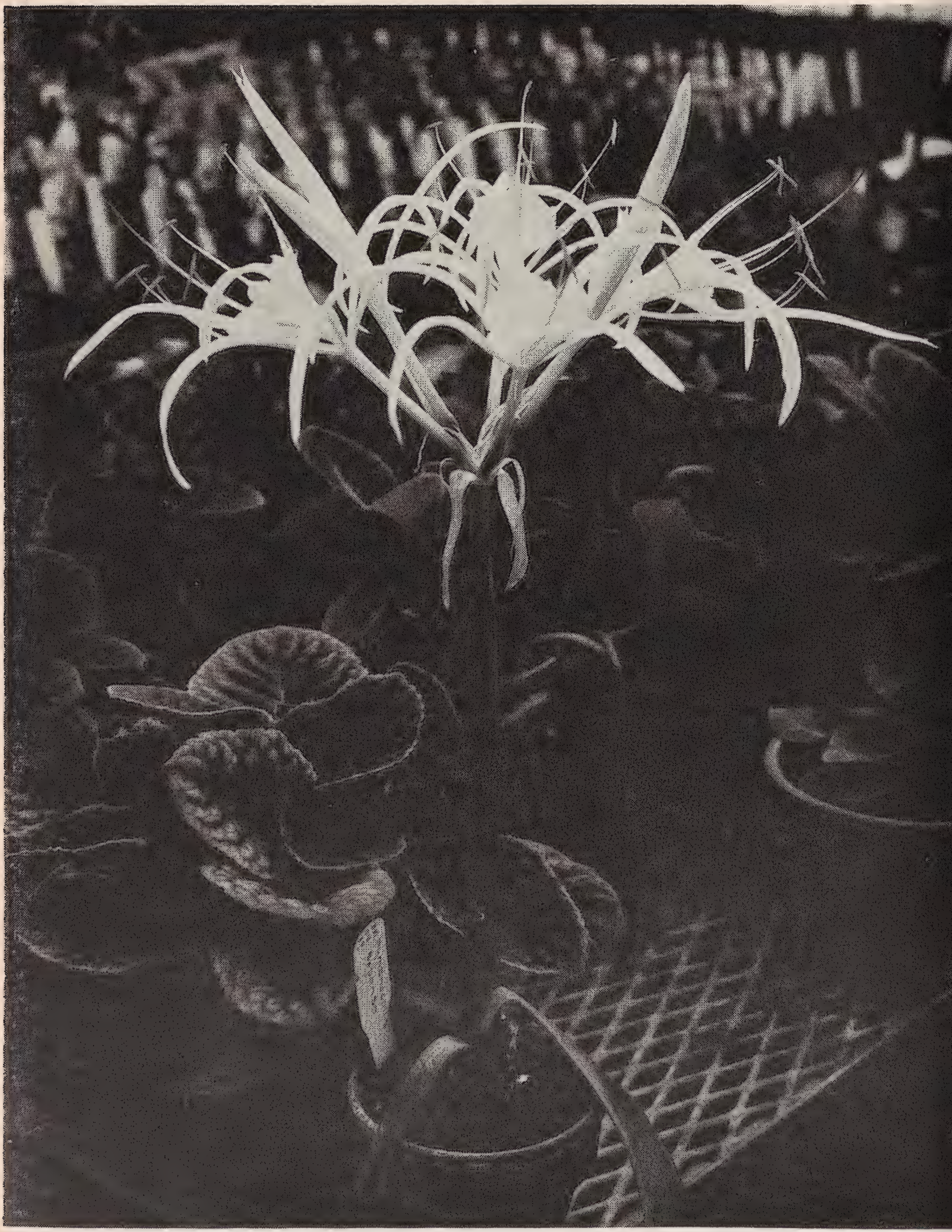

Fig. 22. *Hymenocallis fragrans* as grown at the Los Angeles State and County Arboretum, Arcadia, Calif. The petioled leaves had begun to decline but are still attached to the bulb. Photo by Wilfred M. Noble.

# HYMENOCALLIS FRAGRANS FROM SEED

W. Quinn Buck
*Los Angeles State & County Arboretum*
*Arcadia, California*

In May of 1960 seeds were received under the name "*Hymenocallis expansa*" from the Hortus Botanicus, Groningen, Holland.

These seeds were planted at the Arboretum, and one seedling made slow progress through the years until June 1964, when it produced the magnificent flower scape pictured. Dr. Hamilton P. Traub has identified this wonderful species as *Hymenocallis fragrans* (Salisb.) Salisb., in Trans. Hort. Soc. 1: 340. 1812, excel. Trew, Sel. pl. 28, using photographs furnished by us for the identification (see Fig. 22).

Besides the outstanding beautiful flowers with their strong fragrance, the most outstanding characteristic of this rare species is the foliage, which is distinctly petioled and in that way quite different from any of the species which are commonly grown.

According to Dr. Traub, this beautiful species is native to the West Indies, where it grows commonly among hills near the coast on the Island of Barbados. It differs from *Hymenocallis speciosa* (Salisb.) Salisb., in Trans. Hort. soc. 1: 340. 1812, excel. Redouté, Lil. pl. 156, mainly due to its shorter, narrower, leaf blades.

# AMARYLLID NOTES, 1965

Hamilton P. Traub

### X Sydneya morrisii hybr. nov.

In the 1963 Plant Life, pp. 73-74; 34, Mrs. Morris Clint, of Brownsville, Texas, reported briefly on a new bi-generic hybrid between *Habranthus immaculatus* (seed parent) and *Zephyranthes bifolia* (pollen parent). In November 1964, Mrs. Clint sent a pressed specimen to the writer, and the description is based on this Holotype; and information reported by Mrs. Clint:

Leaves strap-shaped, up to 34 cm. long, 1.2 cm. wide, apex bluntly-acute; scape 31 cm. long; umbel 1-flowered, pedicel 5.6 cm. long, ovary 8 mm. long, 4 mm. in diam.; tepaltube 1.1 cm. long, tepalsegs 6.5 cm. long, narrowly oblanceolate, up to 1.5 cm. wide; flowers resembling *Habranthus immaculatus* in size and shape, color carmine rose (HCC-621) to Neyron rose (HCC-623), white center, and a small green throat; stamens and style shorter than the tepalsegs; stamens shorter than the style, of 2 sets of lengths; stigma trifid, with lobes markedly recurved.

Herba bulbosa; foliis loriformibus usque ad 34 cm. longis, 1.2 cm. latis, apice obtuse acutis; spatha in tubam infra connata, parte libera fenestrata vel bifida; flos illam Habranthi immaculati magnitudine figuraque consimilis carmineo-roseus (HCC-621) usque ad "Neyron"-roseus (HCC-623), loco medio albo, et gula parva viridi; staminibus styloque segmentis tepalorum brevioribus; staminibus stylo brevioribus, in ordinibus longitudinis duobus dispositis, stigmate profunde, trifido, lobis valde recurvatis.

Holotype: No. 974 (TRA), taken Nov. 23, 1963, by Mrs. Clint, Brownsville, Texas; from bulbs obtained from Mexico.

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**Hymenocallis morrisonii** (Vargas) Traub, **comb. nov.**

Syn.—*Stenomesson morrisonii* Vargas, in Nat. Hort. Mag., p. 132, pl. 3, Oct. 1943; *Pseudostenomesson morrisonii* (Vargas) Velarde, Rev. Cienc. li: 51. 1949.

**Hymenocallis vargasii** (Velarde) Traub, **comb. nov.**

Syn.—*Pseudostenomesson vargasii* Velarde, Rev. Cienc. li: 48. 1949.

**Urceolina robledoana** (Vargas) Traub, **comb. nov.**

Syn.—*Pseudourceolina robledoana Vargas,* in Bol. Fac. Sc. Univ. Cuzco 1: 7—8. 1960.

**Pseudostenomesson** (Velarde) Traub, **subg. nov.** (genus Hymenocallis L.; Amaryllidac).

Traub, Genera of Amaryllidac. 1963, p. 76. syn.—Genus *Pseudostenomesson* Velarde, Rev. Cienc. li: 47. 1949.

**Elisena** (Herb.) Traub, **subg. nov.** (genus Hymenocallis Salisb., Amaryllidac).

Traub, Genera of Amaryllidac. 1963, p. 76. syn.—Genus *Elisena* Herb. Amaryll. 201. 1837.

**Ismene** (Salisb.) Bak. ex Traub, **subg. nov.** (genus Hemenocallis Salisb., Amaryllidac.)

Traub, Genera of Amaryllidac. 1963, p. 76. syn.—*Ismene* Salisb., Trans. Hort. Soc. i: 342. 1812; Bak., Amaryll. 121. 1888.

**Crinum amabile Don; var. cuperfolium** (Traub) Traub, **comb. nov.**

Syn.—*Crinum asiaticum* var. *cuprefolium* Traub, in Plant Life 16: 93—94. 1960.

**Crinum luteolum** H. P. Traub et L. S. Hannibal, **sp. nov.**

A Crinum flaccido praecipue differt verni florens (sic in conjugio solivagum) et floribus parvioribus luteolis possidens.

HOLOTYPE: No. 985 (TRA), La Jolla, Calif., from bulb collected at Pichi-Richi Pass, Flinders Range, near Port Augusta, South Australia.

# REGISTRATION OF NEW AMARYLLID CLONES

*Mr. W. D. Morton, Jr., Registrar,*
*Mr. Edward Authement, and Mrs. Emma D. Menninger,*
*Assistant Registrars*

This department has been included since 1934 to provide a place for the registration of names of cultivated *Amaryllis* and other amaryllids on an International basis. The procedure is in harmony with the INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE (edition publ. 1961) and the INTERNATIONAL CODE OF NOMENCLATURE FOR CULTIVATED PLANTS (edition publ. 1958). Catalogs of registered names, as well as unregistered validly published names, will be published from time to time as the need arises. The first one, "DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893-1948" by Norton, Stuntz and Ballard was published in 1949. This may be obtained at $2.50 prepaid from: Dr. Thos. W. Whitaker, Executive Secy., THE AMERICAN PLANT LIFE SOCIETY, Box 150, La Jolla, Calif. CATALOG OF HYBRID NERINE CLONES, 1882-1958, by Emma D. Menninger; and CATALOG OF BRUNSVIGIA CULTIVARIS, 1837-1959, by Hamilton P. Traub and L. S. Hannibal, were published in 1960 Plant Life, with additions to both in Plant Life 1961. In Plant Life 1961, the first edition of THE GENUS X CRINODONNA was published which serves also as a catalog of cultivars. In Plant Life 1964, the first edition of "CATALOG OF HYBRID AMARYLLIS CULTIVARS, 1799 to Dec. 31, 1963" was published. Other catalogs of cultivated amaryllids are scheduled for publication in future issues.

Only registered named clones of Amaryllis and other amaryllids are eligible for awards and honors of the AMERICAN AMARYLLIS SOCIETY at Official Amaryllis Shows.

Correspondence regarding registration of all amaryllids such as *Amaryllis, Lycoris, Brunsvigia, Clivia, Crinum, Hymenocallis,* and so on should be addressed to Mr. W. D. Morton, Jr., Registrar, 3114 State Street Drive, New Orleans 25, Louisiana. The registration fee is $2.00 for each clone to be registered. Make checks payable to AMERICAN PLANT LIFE SOCIETY.

## AMARYLLIS CLONES

EDWARD AUTHEMENT, *Assistant Registrar*

### NEW AMARYLLIS BREEDERS, 1964

*Abbrev.*
Cuch.—Mr. Santo N. Cuchinotto, 2338 Independence St., New Orleans 17, La.
Fesm.—Mr. V. Roger Fesmire, 1170 So. Xavier St., Denver, Colo.
Lander.—Mr. C. W. Lander, 26 Cleveland Av., Milton Park, Salisbury, Rhodesia.
Moody—Mrs. James E. Moody, Box 35, Barney, Georgia.
Prudh.—Mr. Edward C. Prudhomme, 221 Rosa Av., Metairie, La.
Virg.—Mr. Milo C. Virgin, Columbia Road, Covington, La.

## AMARYLLIS CLONES REGISTERED IN 1964

*Registered by M. Van Waveren & Sons, N. V., Hillegom, Holland:*

'Alfred Nobel' (VW. 1964), R; A-784, D-5A; U-4fld; 16″h; fls. 8″ diam; neyron rose (HCC-623) with green to white throat, whitish midribs; spr.

'Annie Hermes' (VW. 1964), R; A-785, D-5A; U-4fld; 18″h; fls. 8″ diam; rose madder (HCC-23); spr.

'Christine Spierenburg' (VW. 1964), R; A-787, D-4B; U-4fld; 24″h; fls. 9″ diam; rose bengal (HCC-25); spr.

'Deanne Durbin' (VW. 1964), R; A-788, D-5A; U-4fld; 22″h; fls. 7½″ diam; turkey red (HCC-721); spr.

'Dr. Ir. Louwes' (VW. 1964), R; A-789, D-5A; U-4fld; 12″h; fls. 7″ diam; indian lake red (HCC-826); spr.

'Elisabeth Andersen' (VW. 1964), R; A-790, D-5A; U-4fld; 22″h; fls. 8″ diam; rose red (HCC-724/3); spr.

'Garry Cooper' (VW. 1964), R; A-791; D-5A; U-4fld; 12″h; fls. 6″ diam; blood red (HCC-820); spr.

'Godesberg' (VW. 1964), R; A-792, D-5A; U-3fld; 19″h; fls. 7″ diam; geranium lake (HCC*-20); spr.

'Maria Callas' (VW. 1964), R; A-793, D-5A; U-4fld; 22″h; fls. 8″ diam; french rose (HCC-520), 3 upper segs whitish midribs with reddish stripes halfway up segs; spr.

'Maria Zamora' (VW. 1964), R; A-794, D-5A; U-4fld; 16″h; fls. 8″ diam; geranium lake (HCC-20); spr.

'Prof. Keesoom' (VW. 1964), R; A-796, D-15A; U-3fld; 15″h; fls. 8″ diam; claret rose (HCC-o21) with purplish cast; spr.

'Recherche' (VW. 1964), R; A-797, D-8; U-4fld; 12″h; fls. 4½″ diam; signal red (HCC-719); spr.

'Red Prince' (VW. 1964), R; A-798, D-5A; U-4fld; 21″h; fls. 8″ diam; blood red (HCC-820); spr.

'Red Trophy' (VW. 1964), R; A-799, D-5A; U-3fld; 14″h; fls. 6″ diam; signal red (HCC-719); spr.

'Scarlet Perfection' (VW. 1964), R; A-801, D-5A; U-4-5fld; 14″h; fls. 7″ diam; blood red (HCC-820) with faint white midrib; spr.

*Description of 3 Van Waveren clones registered 1963:*

'Joy' (VW. 1963), R; A-770, D-5A; U-4fld; 14″h; fls. 8″ diam; scarlet (HCC-19-19/1) with white midribs halfway up segs; spr.

'Leo Gestel' (VW. 1963), R; A-771, D-4A; U-4-6fld; 16″h; fls. 7″ diam; neyron rose (HHC-623); spr.

'Red Shank' (VW. 1963), R; A-772, D-5A; U-4fld; 14″h; fls. 6½″ diam; turkey red (HCC-721) with glossy turkey red throat; spr.

*Registered by Milo C. Virgin, Columbia Rd., Covington, La.:*

'Zeus' (Vir. 1964), R; A-802, D-5A; U-4fld; 24″h; fls. 8″ diam; scarlet (HCC-19); spr.

*Registered by W. J. Perrin, 4753 Press Drive, New Orleans, La.:*

'Grand Red' (Perr. 1964), R; A-803, D-5A; U-3-4fld; 16-18″h; fls. 7″ diam; cardinal red (HCC-822), with glossy cardinal red throat; spr.

*Registered by Santo N. Cuchinotto, 2338 Independence St., New Orleans, La.*:

'Orleans Beauty' (Cuch. 1964), R; A-804, D-5B; U-4fld; 18"h; fls. 6" diam; white base with tyrian rose (HCC-24) stripes each side of white midrib to end of segs; spr.

*Registered by Edward C. Prudhomme, 221 Rosa Ave., Metairie, La.*:

'Delphi' (Prud. 1964), R; A-805, D-4B; U-4fld; 16"h; fls. 6½" diam; fushine pink (HCC-627), greenish midribs ¾ length of segs, heavily veined; semi-ev, spr, fr.

'Dotty' (Prud. 1964), R; A-806, D-5B; U-4fld; 18"h; fls. 8" diam; dutch vermilion (HCC-717/1), cherry red spots in throat; spr.

'Mardi-Gras' (Prud. 1964), R; A-807, D-8; U-2fld; 12"h; fls. 4½ to 5" diam; orient red and blood red, minute red spots intermingled with white, blotchy appearance; semi-ev, spr.

'Neopolitan' (Prud. 1964), R; A-808, D-5A; U-4fld; 14"h; fls. 7" diam; jasper red (HCC-o18) on white base each side of white midrib almost to edge of segs in upper 3 segs and upper half of 2 lower segs, pale green throat; semi-ev, spr.

'Crown' (Prud. 1964), R; A-809, D-5A; U-4fld; 18"h; fls. 7" diam; jasper red (HCC-o18) with white edge around all segs; semi-ev, spr.

'Twist' (Prud. 1964), R; A-810, D-9; U-4fld; 18"h; fls. 5" diam; cardinal red (HCC-822), very light whitish markings in throat; semi-ev, spr.

*Registered by Mrs. Mildred P. Moody, Box 35, Barney, Georgia*:

'Lou Anne' (Moody-1964), R; A-811, D-5A; U-6fld; 24"h; fls 8" diam; upper 3 segs red veins on white, upper half of 2 lower setsegs veined red, lower petseg pure white; de, fr, spr.

'Zenora' (Moody-1964), R; A-812, D-5A; U-6fld; 24"h; fls. 8" diam; bright red, velvet sheen, greenish white midrib shaded to deep red in throat; fr, de, spr.

*Registered by Mrs. A. C. Pickard, 1702 N. Blvd., Houston 6, Texas*:

'Fashion Show' (Pick. 1964), R; A-813, D-5A; U-4fld; 26"h; fls. 9½" diam; carmine rose (HCC-21), shade lighter on lower segs; spr.

'Holiday' (Pick. 1964), R; A-814, D-5A; U-4fld; 24"h; fls. 9" diam; currant red (HCC-822/2), darker throat; spr.

'Princess' (Pick. 1964), R; A-815, D-5A; U-4fld. 30"h; fls. 9" diam; dawn pink (HCC-523); spr.

'Spring Beauty' (Pick 1964), R; A-816, D-5A; U-4fld; 28"h; fls. 9" diam; porcelain rose (HCC-620); spr.

*Registered by Ludwig & Co., Hillegom, Holland*:

'Early White' (Lud. 1964), re-introduction, R; A-105, D-5A; U-4fld; 24"h; fls. 8-9" diam; pure white, greenish-white throat; de, win or spr.

'Fiesta' (Lud. 1964), R; A-817, D-5A; U-4fld; 26-28"h; fls. 7-8" diam; oriental red (HCC-819), darker veined towards the throat; win or spr.

'Mandarino' (Lud. 1964), R: A-818, D-5A; U-4fld; 26-28"h; fls. 8-9" diam; intense capsicum red (HCC-715), blood red in throat; semi-ev, win or spr.

'Red Coral' (Lud. 1964), R; A-819, D-5A; U-4fld; 27-29"h; fls. 8-9" diam; blood red (HCC-820) with darker, glossy throat; de, win or spr.

'Petticoat' (Lud. 1964), R; A-820; U-4fld; 26-28"h; fls. 6-7" diam; pure white, red edged—ideal picotee; ev, win or spr.

'Constant Comment' (Lud. 1964), R; A-821, D-8; U-4-5fld; 22-24"h; fls. 4-5" diam; dark winered Gracilis; ev, win or spr.

'Melody Lane' (Lud. 1964), R; A-822, D-8; U-4-5fld; 16-18"h; fls. 4-5" diam; salmon orange, lighter color in throat; ev, win or spr.

AMARYLLIS REGISTRATION—continued on page 51.

## CORRIGENDA

### PLANT LIFE, VOL. 20. 1964—
### CATALOG OF HYBRID AMARYLLIS CULTIVARS, 1799 TO DEC. 31, 1963

Page 13, 1st. line, for 'Ambiguum' read 'Ambigua'.
Page 13, line 17, for 'A-555' read 'A-565'.
Page 14, line 29, delete 'NR'.
Page 14, line 32, delete '(VM. 1963)'. End with 'for a Dutch breeder'.
Page 16, line 31, read 'Cavalier' R; A-774, D-5A; U-3-4fld; 12"h; fls. 7" diam; scarlet (HCC-19); spr.; I.—Goed. 1962 for a Dutch breeder.
Page 21, line 5 from bottom, for 'Floral Queen' read 'Flora Queen'
Page 22, line 21, read 'R; A-143'.
Page 25, line 2 from bottom, read 'Joy' (VW. 1963), R; A-770, D-5A; U-4fld; 14"h; fls. 8" diam; scarlet (HCC-19) with white midribs halfway up segs.
Page 27, line 11, read 'Leo Gestel' (VW. 1963), R; A-771, D-4A; U-4fld; 16"h; fls. 7" diam; neyron rose (HCC-623).
Page 34, line 14, for 'A-163' read 'A-613'.
Page 35, Line 17, read 'Red Shank' (VW. 1963), R; A-772, D-5A; U-4fld; 14"h; fls. 6½" diam; turkey red (HCC-721) with glossy turkey red throat.

## NERINE CLONES

The following are additions (not registered) to the "Catalog of Nerine Cultivars."

'Mary Fenwick', a *N. bowdenii gigantea* variant; differs in number of chromosomes, relatively larger flowers. See Gard. Chron. March 23, 1963, p. 205. See 'Fenwick' Plant Life 19: 68. 1963.

'Mary Knight', a *N. bowdenii gigantea* variant, very pale pink. See Gard. Chron. March 23, 1963, p. 205.

'Mary Sealy', a *N. bowdenii gigantea* variant, darker pink. See Gard. Chron. March 23, 1963, p. 205.

'Quinton Wells', a *N. bowdenii gigantea* variant, with smaller flowers, segs markedly waved, first to flower. See Gard. Chron. March 23, 1963, p. 205.

# AMARYLLID GENERA AND SPECIES

HAROLD N. MOLDENKE

[In this department the descriptions of amaryllid genera and species, particularly recent ones, translated from foreign languages, will be published from time to time so that these will be available to the readers.]

*Milula spicata* Prain, Ann. Roy. Bot. Garden, Calcutta 5(2): 165, plate 200. 1895-(1896).—Herbs; bulb elongate, the lower half covered with fibrous scales which are the remains of old leaves; roots numerous; leaves linear-lanceolate, equaling or surpassing the fistulose scape which, in turn, is twice as long as the bulb; spike cylindric, included by a basal, spathaceous, ovate-acuminate bract; flowers becoming green-reddish, small, very many, campanulate, the perianth-segments equal, their margins undulate-fimbriate; stamens in two series, the exterior three alternate with the carpels and with the lower half of the filaments expanded and petaloid, the lower 3 opposite the carpels, slightly shorter, filiform upwards; anthers versatile, all perfect; ovary subglobose; ovules attached at the inner angle of the cell somewhat above the base; capsule globose, with always one ovule (seed) in each cell, sometimes both (two?) aborted; seeds black. In the eastern Himalayas, at Chumbi, collected by Do-tho, King's hired collector.

*Phaedranassa megistophylla* Kraenzl., Engl. Bot. Jahrb. 54 (Beiblatt #117); 2—3. 1916.—Bulbs subglobose, somewhat depressed, 8—9 cm. in diameter, copiously covered with brown tunics, 1- or 2-leaved; leaves subsessile or shortly and broadly petiolate, very broadly oblong, obtuse, (Pale?)—margined, rather thick, fleshy, canaliculate, the largest seen by me 37 cm. long (including the short petiole), about 11—12 cm. wide, usually more or less shorter and broader; scape without inflorescence 75—105 cm. tall, thick, terete, glaucous as are also the leaves and flowers, pruinous; spathe of the inflorescence quickly perishing in linear fragments; flowers more than 20, successive; pedicels during the anthesis of the flowers 6—8 cm. long, those of the buds much shorter, the entire inflorescence resembling that of Brunsvigia; ovary during anthesis oblong, later triquetrous, incrassate; leaves of the perigonium merely connate, later noticeably dilated and divergent, forming and narrow scarcely open little funnel, all equally long, 4 cm. long, to 7 mm. wide toward the apex, glacous, pruinous on the outer surface; stamens fertile during anthesis, equaling the perigonium, the anthers soon becoming effete and deciduous; filaments slightly compressed; style considerably surpassing the perigonium, to 6 cm. long; stigma slightly declinate, somewhat 3-parted.

Urceolina microcrater Kraenzl., Engl. Bot. Jahrb. 54. (Beiblatt #117): 3—4. 1916.—bulbs globose, about 4 cm. in diameter, with numerous roots, narrowed into a short neck 2 cm. in length; leaves absent during anthesis; scape slender, fine, 45 cm. tall to the inflorescence; spathe divided into 2 or 3 linear segments 3—4 cm. long; flowers 5, arranged in a raceme; pedicles during anthesis variable in length, 2—8 cm. long, slender; ovary ovoid, deeply 3-sulcate, 5 mm. long and thick;

tube of the perigonium narrowed from the slightly wider base, to 6 mm. long, green, abruptly dilated, campanulate, not truly urceolate above, the lobes 6, equal, lanceolate, free almost to the base, 2 cm. long, 6 mm. wide, yellow later green, white-margined toward the apex, the entire flower at anthesis 3.5 cm. long and 2 cm. in diameter; stamens about equaling or somewhat surpassing the perigonium; style linear, somewhat longer; stigma clavate, incrassate, manifestly papillose.

*Brunsvigia rautanenii* Bak., Bull. Herb. Boiss. Ser. II. Vol. 3, p. 667. 1902.—Bulb unknown; leaves unknown; peduncle 2.5—3.2 cm. in diameter at the apex; umbel 20—30-flowered; pedicels strict, ascending, 22.9—25.4 cm. long, strongly angled at the apex; perianth red, the tube cylindric, 1.3 cm. long, the segments of the limb unguiculate, 1.7—1.9 cm. long; filaments red, longer than the limb; ovary obconic, acutely trigonous, 1.1—1.3 cm. in diameter. Conspicuously different from all the other known species.

# AMARYLLIS CYBISTER FLOWERED IN CALIFORNIA

W. Quinn Buck,
*Los Angeles State & County Arboretum,*
*Arcadia, California*

In March of 1963 a bulb of *Amaryllis cybister* came as a gift from Prof. Ira S. Nelson of the University of Southwestern Louisiana at Lafayette, La. A flower spike had started to emerge from the small bulb, which was well established in a four-inch pot.

The spike developed slowly as we waited impatiently to see the flowers. When finally the buds did open we had a happy surprise in that the color was not what we had expected from the descriptions of this orchid-flowered *Amaryllis* from Bolivia and Brazil. The five flowers opened all together and formed an elegantly compact group, each flower having creamy green segments with a crimson base that gave the flower a scintillating red throat. Everyone who got to see this species was delighted with it.

After making good growth for a year, the bulb bloomed in 1964 with an even finer spike, which was larger and taller than in 1963 but still smaller than the type described. Again some flowers were selfed, and part were pollenated with pollen from hybrids and other species. No pods formed on either spike. When crossed on *Amaryllis striata fulgida* by Mrs. Bert Williams, she was able to get pods to set, and she and her friends are looking forward to the flowering of these vigorous seedlings.

This thoroughly charming species should be more widely grown as it can become available. The green form suggests interesting breeding possibilities. See Cover Design of the present issue, and Fig. 23, for unique form of this species.

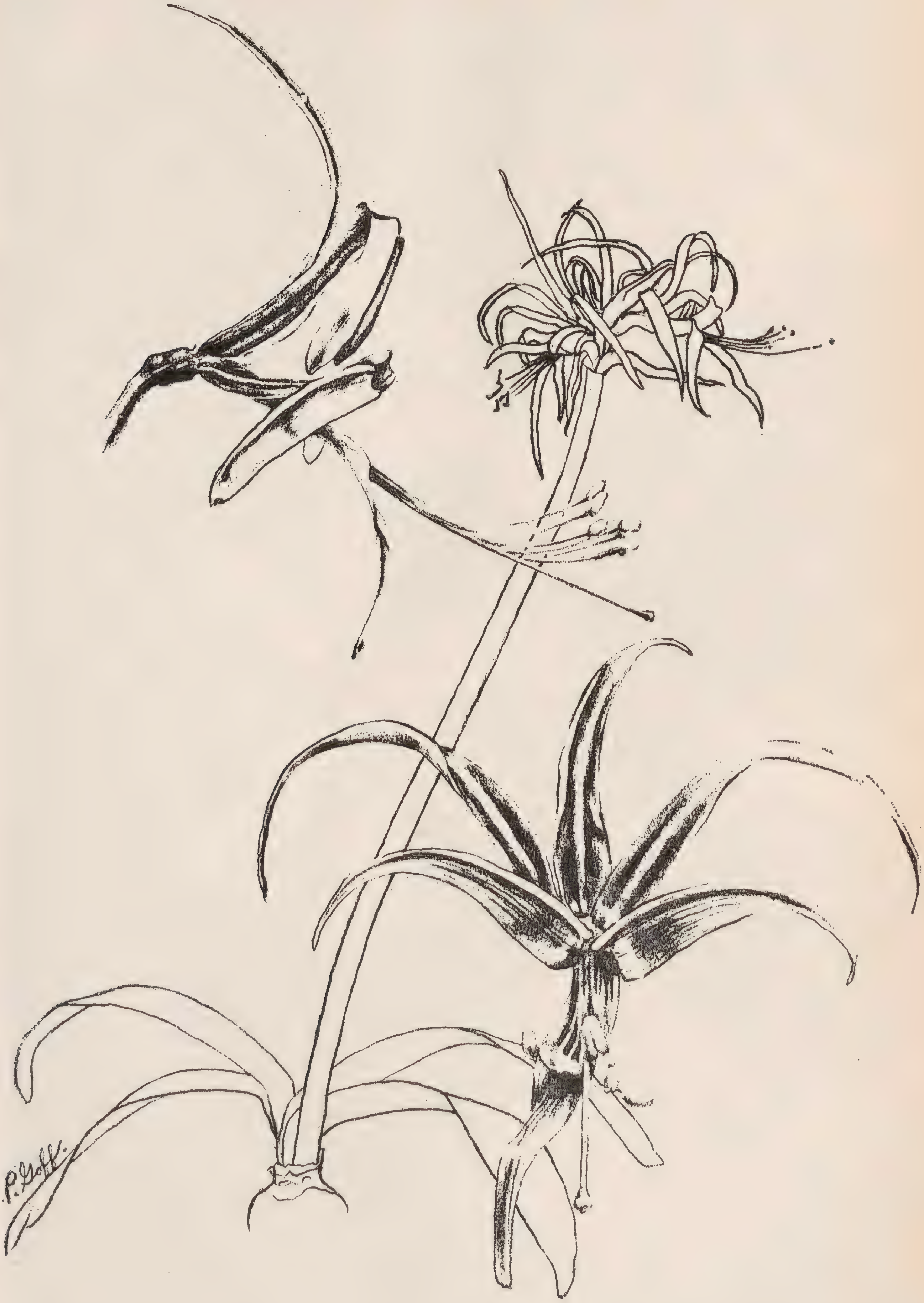

Fig. 23. Drawings of *Amaryllis cybister* made by Prof. Penrith Goff as an alternate cover design.

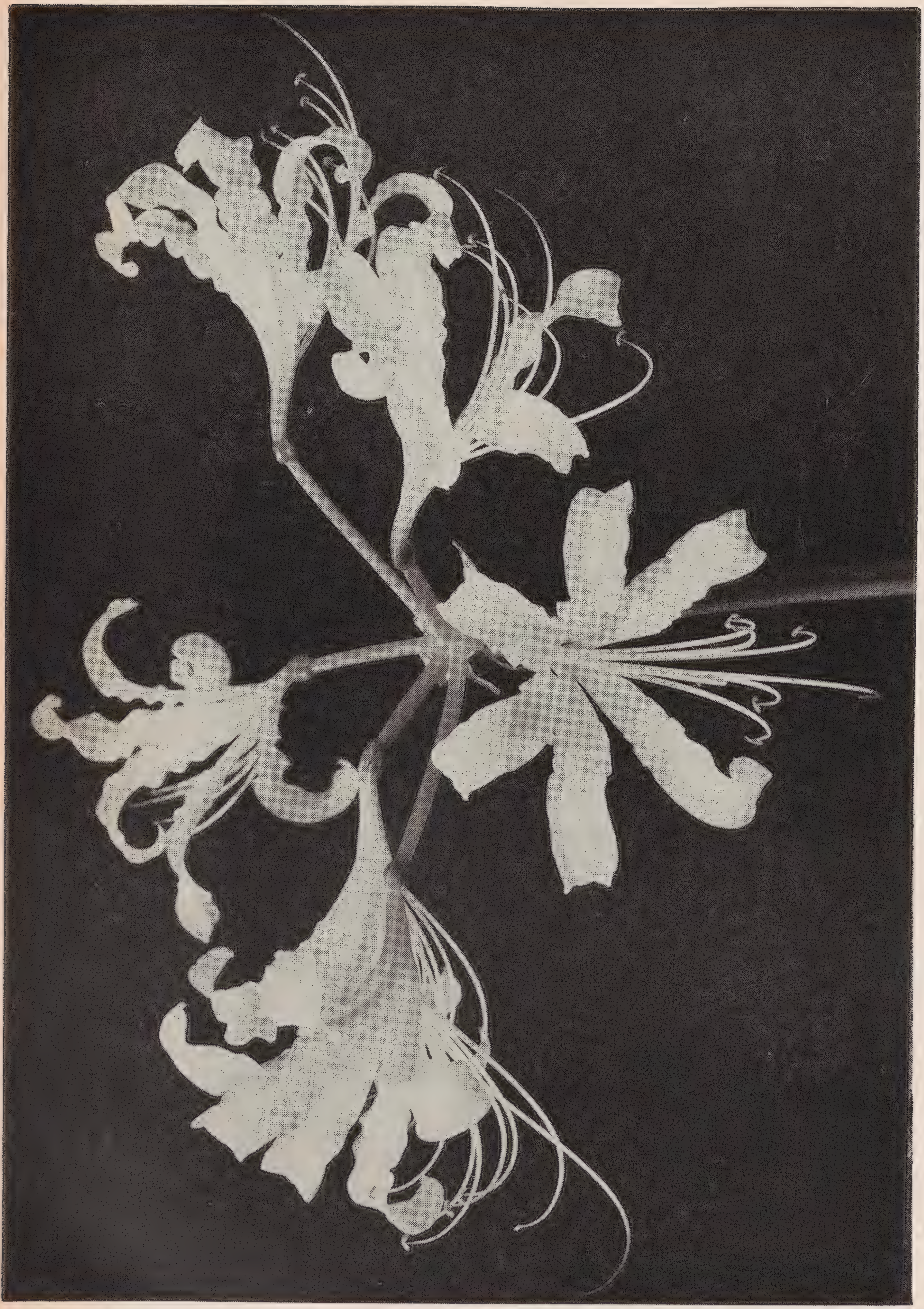

Fig. 24. Hybrid *Lycoris* (*L. haywardii x L.* "Sperryi"), as grown near Nashville, Tenn., Aug. 18, 1964. Color white with faint pinkish lines along outside of segs. Photo by Sam Caldwell.

# 3. GENETICS AND BREEDING

## 1964 LYCORIS REPORT

Sam Caldwell, *Nashville, Tennessee 37211*

The year 1964 was the best ever for lycorises in my plantings. Everything bloomed that reasonably could have been expected to flower, and most exciting was the opening of four new hybrids.

In my area (middle Tennessee) the winter preceding a lycoris season strongly affects the amount of bloom we get. Following a mild winter, bloom is usually good; a very cold one damages foliage on a number of species and thus inhibits flower production.

For buyers of fuel to heat homes, our 1963-'64 winter brought record cold but for plants it was relatively mild. The seeming contradiction is explained by the fact that there were many more days than usual of temperatures in the teens and twenties, requiring the consumption of much fuel, but there were never any extremely bitter spells. Five above zero was the lowest temperature experiencd—far from the 13- and 15-below-zero marks of the previous winter, which had completely stopped bloom on most of my lycorises that make foliage in fall. Apparently those species maintaining live green leaves over the winter can tolerate extended periods of Freezing weather but begin to suffer when temperatures drop near zero.

### THE SPECIES, IN ORDER OF BLOOM

First to appear was a scape of the orange colored *L. kiushiana,* on July 10.

July 13 brought a scape of the hardy yellow *L. chinensis* into prime condition. Most notable observation is that since my one bulb, planted in 1958, started blooming in 1961, it has bloomed regularly for four years straight. There seems to be little increase, though judging from foliage of the past spring, there are now two bulbs.

All through the second half of July there were blooms of *L. sanguinea* in numerous locations. Its orange color is much better in shade than in the sunny places but somehow does not appeal to me.

One small scape of *L.* "cinnabarina" was open on July 20. It will take further observation but I still think this may turn out to be really *L. kiushiana.*

From July 20 to 30 there were excellent blooms of *L. haywardii.* It thrives in the shady spots and the blooms look best and last longest there.

Also from July 20 through two or three weeks of generous flower production we enjoyed *L. squamigera* in all locations where I have established bulbs.

Reaching peak on July 26 and lasting another week were two good scapes on the large hardy yellow lycoris which we call *L.* "sperryi." Actually, I have about eight large bulbs of this now, so the percentage of bloom was not good. Miss Aileen Bishop, who has the original clumps of this species here in Nashville, had nine scapes. It is similar to *L. chinensis* but has taller scapes and comes consistently about two weeks later than *chinensis*.

During the first half of August there were three wonderful scapes of white *L. houdyshelii* on a clump shaded by a dogwood tree. I have bulbs in two other locations that did not flower.

*L. incarnata* was late starting this year but by mid-August was showing dozens of scapes.

Also the middle of August brought the first of *L. sprengeri,* with additional blooms coming to stretch the season for more than two weeks.

Through the same period there developed exactly 15 very fine scapes on *L. caldwellii.* Definitely the best display I've seen on this species was due, apparently, to the cool, cloudy and wet weather occurring at the time. All my bulbs of this are in shady locations now. Flowers were unusually large, on two- to three-foot scapes, and the pale yellow color held up well without the usual fast bleaching.

All of the latter half of August the fertile *radiatas* bloomed in quantity. The strain sent me by B. Y. Morrison always starts a little later than the other fertile form I have. My common *radiatas* (the triploid, sterile form), which normally flower around mid-September, gave very scant bloom this year. They are never as floriferous here as the fertile ones; in the severe 1962-'63 winter they appeared to be hurt more than any others, and their bulbs may not be fully recovered as yet.

Beginning around the end of August and lasting through most of September were dozens and dozens of scapes on *L. elsiae* and the various other delicately pastel tinted spiderlily forms which dealers sell as ''Albiflora,'' ''Albiflora carnea,'' ''White'' lycoris and the like (all grown here in coldframes, covered in winter). This ''near white'' group was covered in my report of last year, so I'll not repeat details given there. Ample rainfall and unseasonably cool nights that we experience through their blooming this year enhanced the richness of their usually pale coloring. Yellow, pink and salmon tints in various blooms were strong and beautiful.

Because many factors cause color variation in these flowers—age of bloom, light, temperature, soil and moisture—one runs into difficulty when attempting to segregate bulbs that are producing identical blooms. There is a ''family resemblance'' in all of them but certainly there are numerous variants—some meriting separate propagation. Strangely, in spite of the ''albiflora'' (white-flowered) name, I have never seen a pure white individual among them. Has anyone? I mean white all the way, of course—not just fading white from original cream, yellow, salmon or pinkish tints.

The variation among these flowers tends to support the Japanese theory that *L. albiflora* is a natural hybrid between *L. aurea* and *L. radiata radiata;* at least, in my own crosses of the fertile *radiata* with *L. sprengeri* there is variation among seedlings quite like that occurring in the ''albiflora'' group.

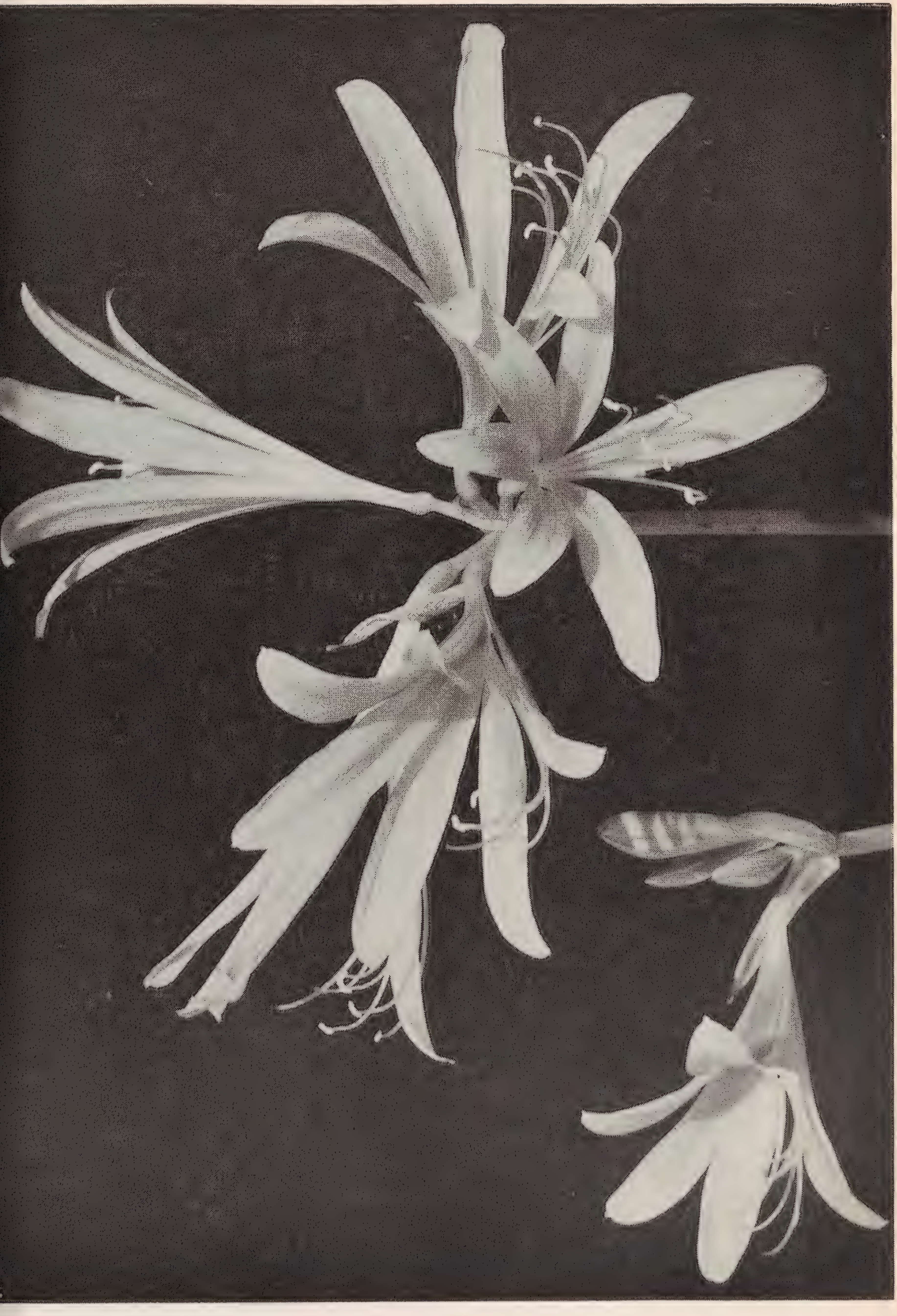

Fig. 25. Hybrid *Lycoris* (*L. haywardii x L. sanguinea*), as grown near Nashville, Tenn., Aug. 4, 1964. Color orange pink, bluish tints at the tips of the segs with age. Photo by Sam Caldwell.

## HYBRIDS

Beginning August 7 and running through August 25 there were 48 scapes on various lots of the *sprengeri-radiata* hybrids that I started in 1954 and '55 and that began to bloom first in 1961. Dr. Traub has named these *L.* x *jacksoniana*, replacing the convenience label, "Sprenrad Hybrids," formerly used. Variations in the numerous flowering scapes brought daily thrills. I marked a few that seemed outstanding; I rather prefer those with widest segments and the deep rose and purple-red shades. However, some of the lighter ones, mainly pink but with blue-tipped segments, are beautiful.

When three scapes began to push up on *L. haywardii* X *L. sanguinea* seedlings in July I was excited, not only because this was to be their first bloom but also because the seedlings were just five years old. I had never previously had a lycoris seedling to bloom in less than six years. Eventually two more scapes came up on another lot of the same cross (these were six years old), and two weeks later there were two scapes on a group of reciprocal cross (*L. sanguinea* X *L. haywardii*) seedlings. These hybrids turned out to be highly predictable in appearance; their parents are similar in flower form and so the "children" are the same, with plain, smooth-edged segments. (See Fig 25.) The color is a salmon or orange-pink shade with a suggestion of *L. haywardii's* blue segment tips showing as the flowers age. Scapes averaged about 15 inches tall, with three to five flowers per umbel and the umbels measured some seven inches across. The variation so evident in *sprengeri-radiata* hybrids is not present in this cross—flowers on all of the seven scapes were practically identical. Those with *L. sanguinea* as seed parent did come two weeks later than the others and had flowers just a little larger and with slightly wider segments. These are points to be checked in future years, because they could be due to differences in growing conditions.

These "Haysan Hybrids" (temporarily, for convenience) are interesting and probably worth having but to my way of thinking will not create much of a stir in the lycoris world.

Back in 1958 when I first saw the golden *L.* "sperryi" flowers here in Miss Bishop's garden, I brought home pollen and used it on a bloom of my *L. haywardii*. Six large seeds resulted and eventually two bulbs. When I saw a big bud pushing out of the ground in August from one of these I began mentally to visualize what might result from a blending of lavender-pinkish *L. haywardii*, with its severely plain form, and the golden-orange frilliness of spiderlily flowers on *L.* "sperryi."

A sturdy 23-inch scape grew up with six light greenish buds marked with pink longitudinal lines. They opened on August 18, slightly greenish-yellow for a few hours but then becoming white. (See Fig. 24). For all practical purposes it is a large (more than 10 inches across) loose umbel of white flowers with crinkled and reflexed segments in typical spiderlily pattern. Very faint pink lines remain along the midribs of segments on the outside and greenish-yellow lines radiate from flower centers within, but the overall effect is white. While individual flowers are pretty and "different," they are held on relatively long pedicels—up to $2\frac{5}{8}$ inches—and the umbel is less attractive to me than a more compact type. I have a few more bulbs of this to flower (from repetitions of the cross in 1959) and expect to see considerable variation in the seedlings. Actually, something good should come of this.

Of special interest in my lycoris "nursery" frame was the fact that two scapes of the previously mentioned "Haysan Hybrids" were still in good condition and were just about a foot away from the big white "Haysper" bloom. It was hard to realize that both had the same seed parent (see accompanying photographs).

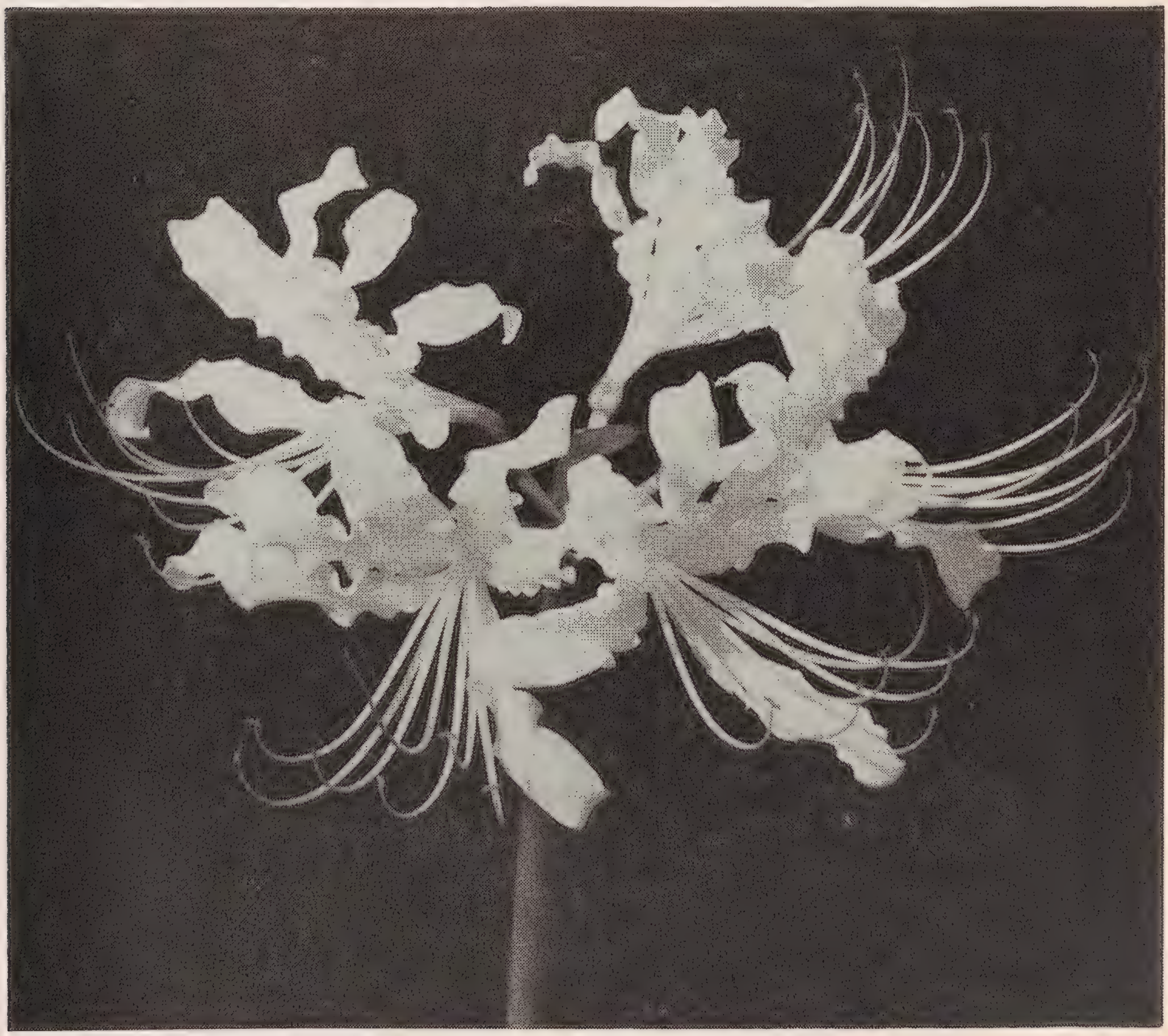

Fig. 26. *Lycoris* x *washingtonia* (*L. radiata* x *L. chinensis*), originated by Dr. John Creech. Flowered near Nashville, Tenn., Aug. 20, 1964. Color soft buttery yellow self.

The next hybrid I saw was not of my own but was the *L. radiata*—*L. chinensis* cross made in Washington, D. C. in 1950 by Dr. John L. Creech. Dr. Traub sent me a bulb of this in July, 1962, and it bloomed August 20 this year. It is an altogether delightful modest-sized spider-lily type yellow lycoris. See Fig. 26.) Some years ago I received a report that flowers of this cross were "yellow with longitudinal reddish stripes,'' but mine turned out to be a soft buttery yellow self—no red markings at all. Probably different seedlings vary, though Dr. Traub reports no marked difference in several he has made to bloom. Mine had a 15-inch scape with five flowers in a beautifully compact but not crowded umbel about 6 inches across. Segments are a little broader than in *L. radiata;* otherwise it reminds one of a yellow *radiata.* I believe it will be extremely popular when stocks can be increased.

Closing the season for me in late September were two nice scapes on *L.* x *lajolla.* Dr. Traub sent me seeds when he made this cross of *L. aurea* and *L. traubii* back in 1957. Thus these seedlings bloomed in seven years, under pot culture all the way, as both parents are too tender for outdoor planting here. I had lifted and repotted these bulbs in August, just a couple of weeks before the scapes started, so doubt that these first blooms, from the recently disturbed bulbs were typical size. Nevertheless, this seems to be a relatively large-flowered lycoris of rich golden color. Flowers in the umbels (nine had five each) have a pleasing upward tilt and broad segments. A tentative judgment is that besides being a very beautiful lycoris it is going to be one well adapted for container culture. The potted bulbs have grown clean, healthy and strong from the beginning.

### LOOSE END

My lycoris report last year told of a ''New Import—Hardy Golden Spiderlily,'' which had been marketed in this country in 1962. I have over 500 of these bulbs and distributed a number to friends for trial in different localities. Thus far I have had no bloom nor has any been reported to me, although the bulbs make foliage growth early each spring. I reported last year the resemblance of their foliage to the leaves of the rare *L. chinensis* and *L.* ''sperryi''—hardy yellow species that I have. But with another year these ''New Import'' bulbs have grown larger and their leaves broader; to me they look exactly like *L. squamigera* foliage. I will not be greatly surprised if the ''Hardy Golden Spiderlily'' label proves to be a hoax and the bulbs really *are L. squamigera.*

Meanwhile, now in the fall of 1964 our local Woolworth stores are selling bulbs with once again the same color plate of a yellow lycoris and the same ''New Import—Hardy Golden Spiderlily'' label of two years ago. So I'm still hoping the label may be true.

## STEPS TOWARD THE LARGE-FLOWERED YELLOW AMARYLLIS HYBRIDS

HAMILTON P. TRAUB

In 1952, Dr. Castellanos sent seeds of the very light yellow-flowered *Amaryllis* species, *A. aglaiae.* When these seeds germinated and bulblets had been formed, these were widely distributed so that progress could be made toward the large-flowered yellow *Amaryllis* hybrids. Some of the results have been reported in past issues of the Amaryllis Year Book.

A few years ago, plants of *Amaryllis aglaiae,* maintained in plastic pots, bloomed for the writer, but it was not possible to set seeds on these either by selfing, or crossing of sibling seedlings, or by crossing with the large-flowered white hybrid *Amaryllis.* The plants made lush growth in pot culture and this may have had something to do with the lack of results.

In the spring of 1964, one of the plants set out in the open under ordinary garden conditions produced a scape, and this time seeds were obtained by selfing, and by crossing with a large-flowered white with yellowish throat. This latter cross is the first step toward a large-flowered yellow *Amaryllis.* Seeds were sent to Mr. Quinn Buck, and a few others, so that rapid progress can be made.

When the hybrid seedlings flower, an attempt will be made to intensify the yellow by selfing; back crossing on *A. aglaiae,* and also by crossing with the very light yellow form of *Amaryllis evansiae,* and the yellow form of *Amaryllis pardina,* if the last named can be obtained in the meantime. Possibly, the greenish-yellow form of *Amaryllis calyptrata* might also be useful in such a breeding project. It is hoped that others will report on their progress toward the large-flowered yellow *Amaryllis* hybrids in the future issues of the Amaryllis Year Book.

## DAYLILIES IN 1964

W. Quinn Buck, *Chairman*
*Daylily Committee, American Plant Life Society*

During the 1964 daylily flowering season the most outstanding event for the writer was the opportunity to visit the garden of Dr. Hamilton P. Traub in La Jolla, California, for the first time in several years. This mid-June visit was an especial pleasure because of all the new things that Dr. Traub had to exhibit.

While waiting for the heavy morning overcast to clear away and permit the day's new flowers to open, we talked about the new work at length. This discussion was interrupted by Dr. Traub's bringing out incredibly beautiful and fresh flowers from the day before which had kept perfectly in the refrigerator. With the exception of a couple of fine diploids selected for release, all were tetraploid seedlings derived from a polyploidized form of 'Artemis' (Norton), which Dr. Traub had admired in its diploid form for its complete sunfastness and "butterfly" shape; both of these characteristics have been established in Dr. Traub's lines, so that now he has huge flowers with wonderful shape, substance, and sunfastness, in a wide range of yellows and golds. (See Fig. 27). One of the most outstanding was a light cream flower of medium size, and with superb substance and shape. There were also several reds of unbelievable color quality.

By late morning the high fog had cleared sufficiently to allow the morning's flowers to open quickly, and in the garden we again were impressed by the array of seedlings in bloom. All kinds of fine yellows were interspersed with reds of greatest depth and smoothness; there

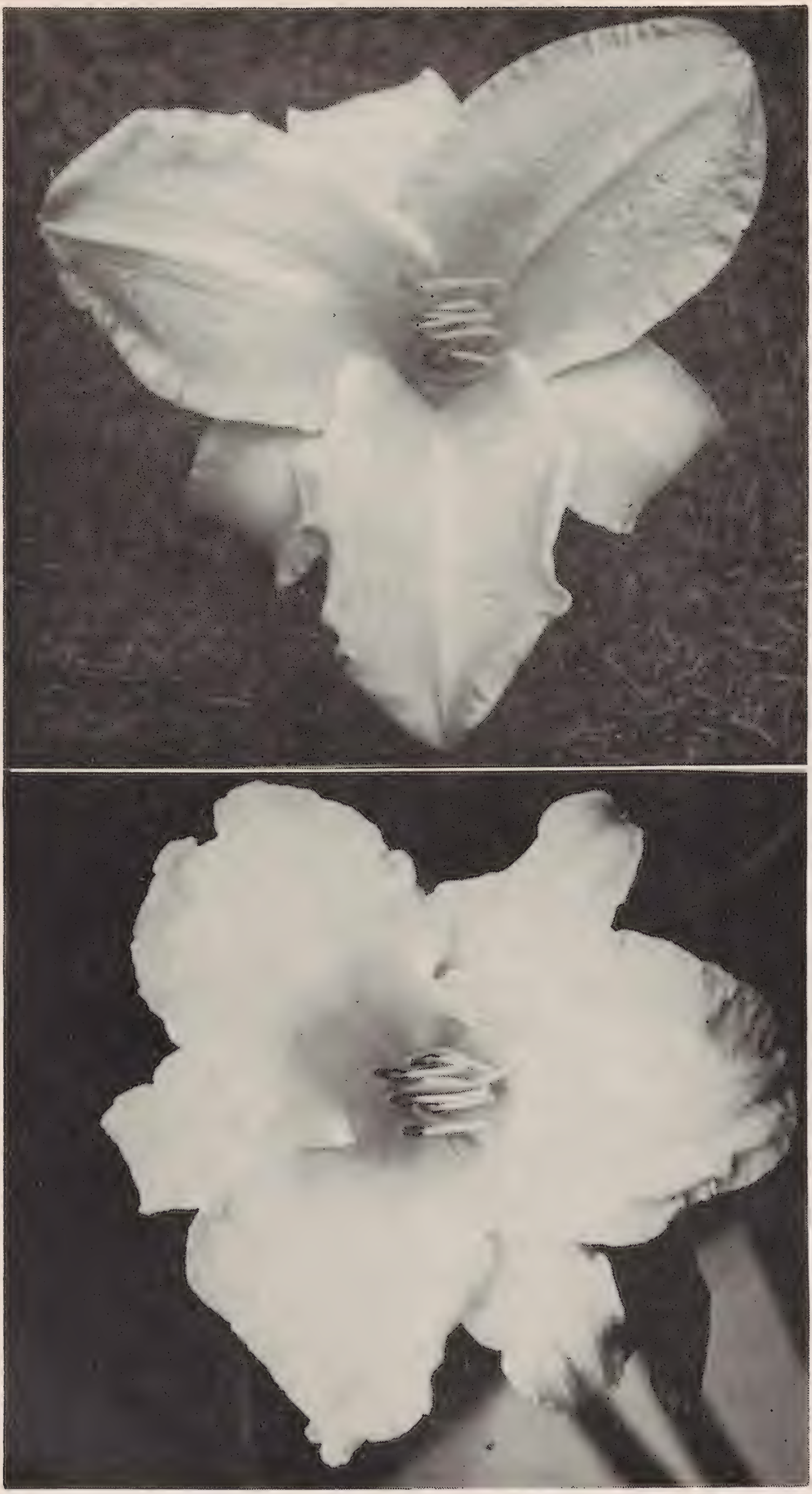

Fig. 27. *Hemerocallis washingtonia.* Butterfly strain tetraploids raised by Hamilton P. Traub, La Jolla, Calif. (Left) light yellow; (right) golden yellow. Photo by Jack Romine, 1964.

was also one red with very good branching, and it is to be used with all the others. Dr. Traub's pride was a huge reddish lavender-purple, (See Fig. 28), from which he hopes to obtain a whole new line of purples and lavenders. The writer regrets not being able to give names or numbers for some of these fine seedlings.

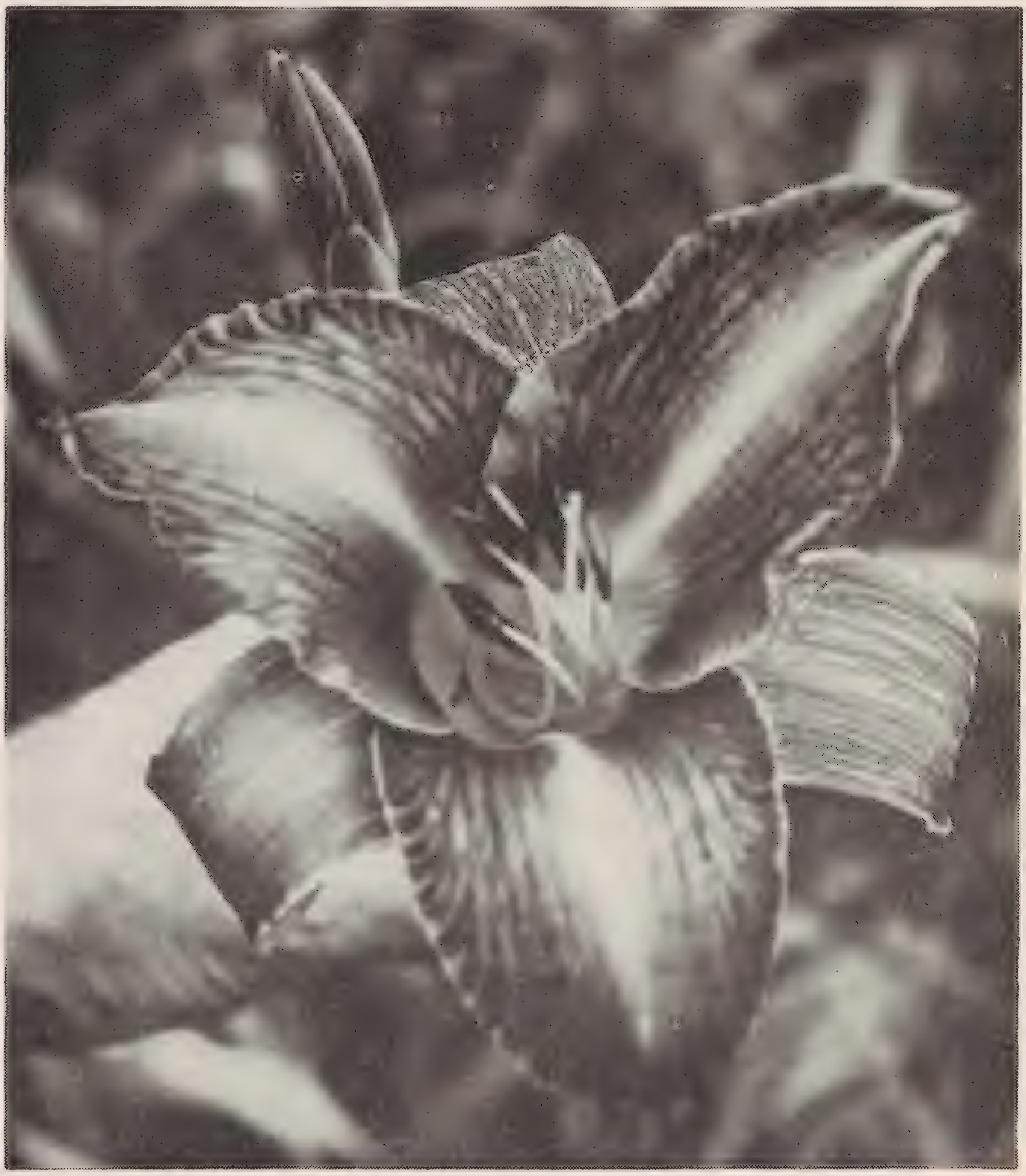

Fig. 28. *Hemerocallis washingtonia.* Mulberry purple tetraploid raised by Hamilton P. Traub, La Jolla, Calif. Photo by Jack Romine, 1964.

In the Buck garden in Arcadia, California, the season was quite late because of the cool spring, but there were many interesting seedlings, such as several huge, bold tetraploid bicolors derived from 'Sue Booth' (Buck). There were some large bright reds with 'Tetra Painted Lady' in their ancestry, besides some handsome dark reds of rich quality. An unusual kind of mahogany red was exhibited by a group of seedlings derived from 'Tetra Redrock Canyon'; this group, unfortunately, lacked sunfastness. In the Buck garden there was a really great range in the yellow-to-orange group in height, size, and shape. See Fig. 29 for the clone 'Arcadia Pink'.

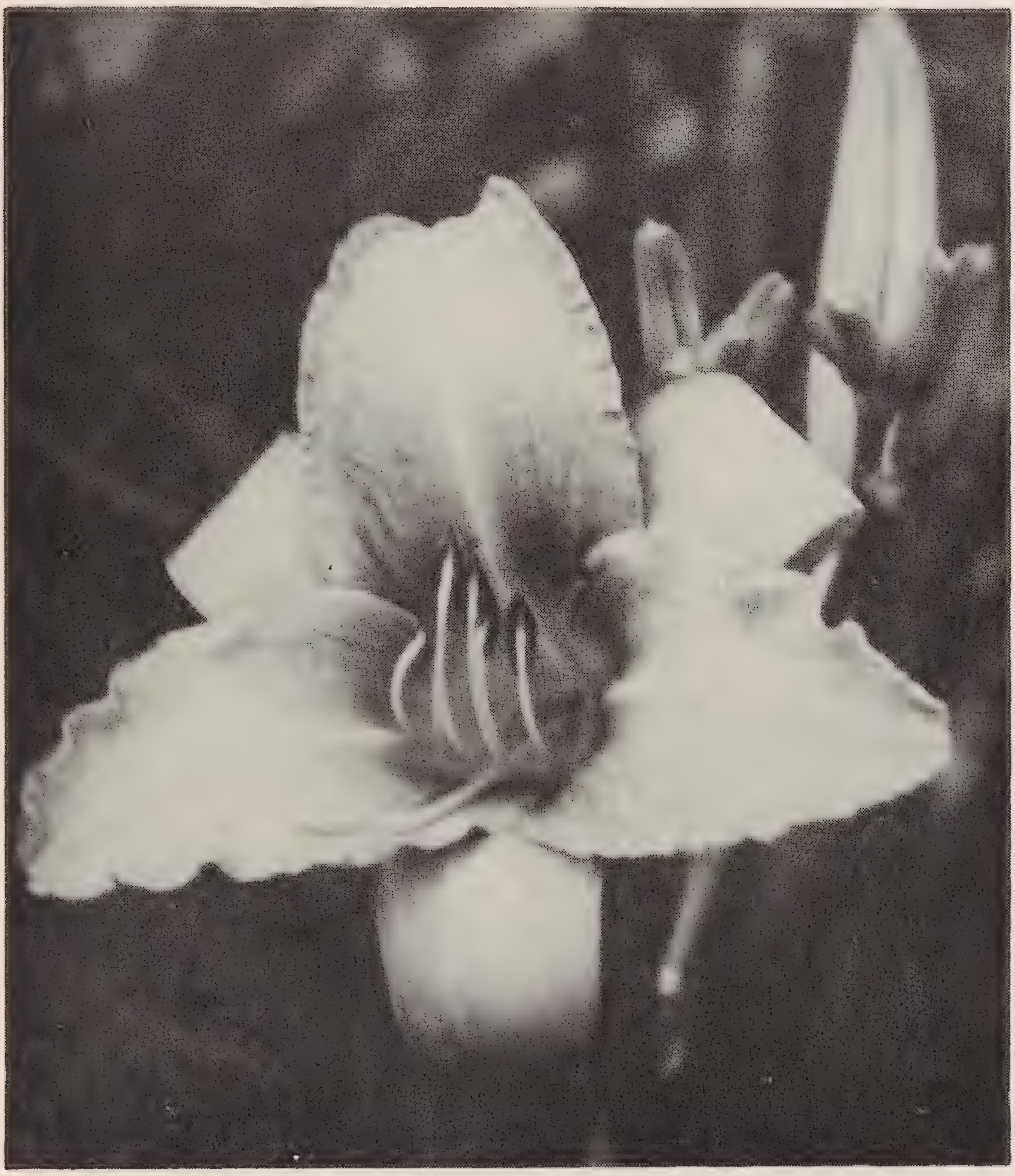

Fig. 29. *Hemerocallis washingtonia.* Tetraploid 'Arcadia Pink', raised by W. Quinn Buck, Arcadia, Calif. Photo by Jack Romine, 1964.

The Fay-Griesbach tetraploids in Illinois can be reported on only from information given by visitors, as well as from the excellent slides of Robert Baker Wynne, and from information and slides furnished by Mr. Orville W. Fay himself. During 1964, Mr. Fay and Dr. Robert A. Griesbach flowered about 4,000 new tetraploid seedlings, including some 400 bright reds; all colors yet obtained in daylilies were represented, as well as several entirely new colors. Mr. Fay reports that the number of visitors this year was so great as to make it impossible

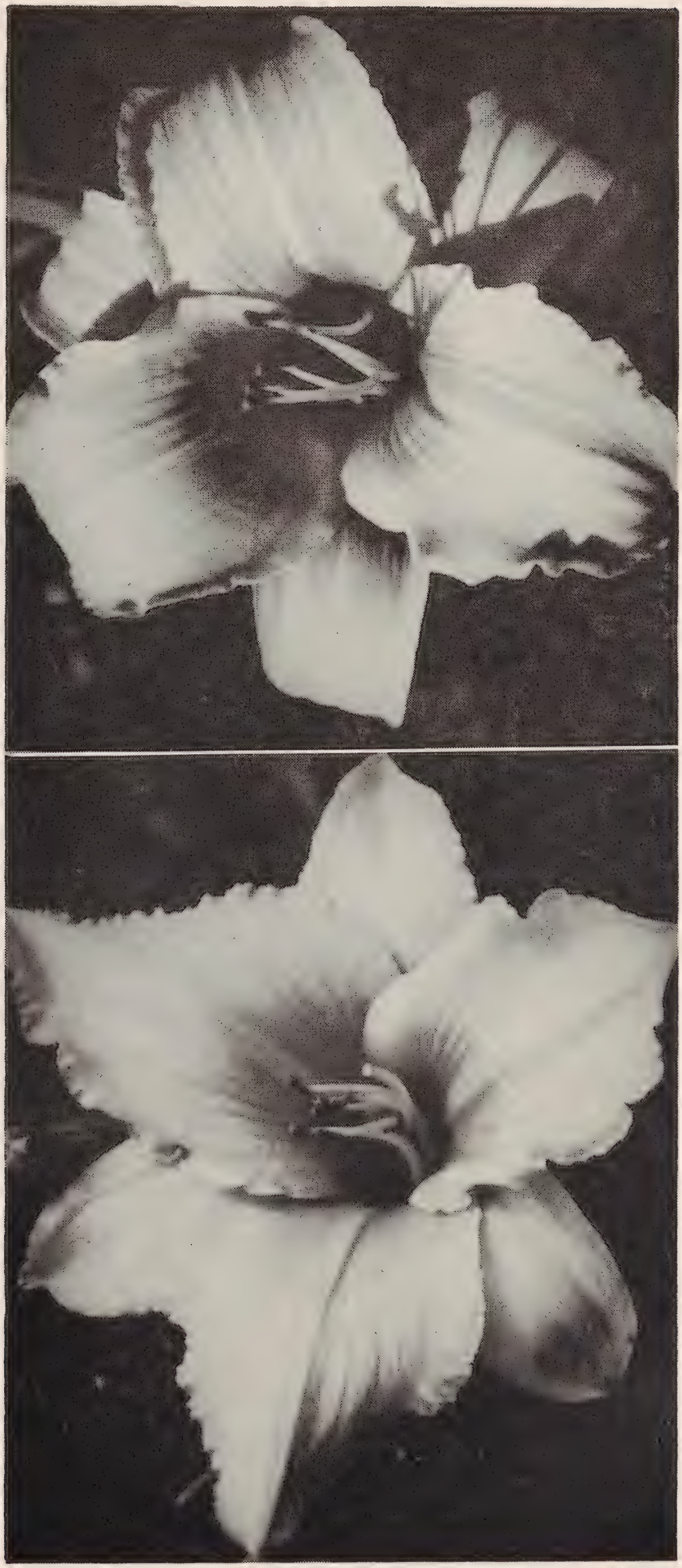

Fig. 30. *Hemerocallis washingtonia.* Fay tetraploids (left) Fay 62-51; (right) Fay T63-24.

for them to study and number the 1964 crop of seedlings, which will have to be held over for another year.

In 1963 Mr. Fay flowered around a thousand tetraploid seedlings, the majority involving 'Crestwood Ann'. The 1964 season afforded opportunities for further observation of the selected seedlings. T62-51 (see Fig. 30) is a particular favorite with Mr. Fay because of its shape, its color—nearly white—and its tremendous substance. This is an induced tetraploid of a cross of Frances Fay X 58-22. This same cross also gave T61-17, which Mr. Fay considers one of his best. Melon T63-24 (see Fig. 30) and T63-5, which is not a melon but a very light color, are among the best of the 1963 selections, because of fine flowers, excellent stems, and good plant characteristics.

Mrs. W. T. Hardy, in Alabama, flowered a number of fine tetraploid seedlings, some of the most beautiful coming from crosses of 'Mildred O'Neal' (Kraus). R. W. Munson, Jr., in Florida, reported flowering a few superior yellow tetraploids. Dr. Virginia Peck, in Tennessee, treated some 7,000 germinating seed in 1964, and she undoubtedly flowered additional fine induced seedlings. In 1963 Dr. Peck had a number of fine tetraploids of which we got to see slides.

Among the newer diploid daylilies the most outstanding in the writer's collection in 1964 were 'Louise Simon' (MacMillan), a huge melon of great quality; 'Sholom' (MacMillan), of particularly fine flat shape and light color, more yellow than melon, but very beautiful; 'Blue Jay' (Spalding), the best ''blue'' the writer has obtained anywhere; 'Prairie Beauty' (Marsh) and 'Prairie Champ' (Marsh), both large and good; 'Frankly Fabulous' (Childs), a gold-edged melon that can be most incredibly beautiful; 'Symphonette' (Childs), another wonderful melon with a golden glow throughout the color; 'Laurel Anne' (Fischer), very lovely in spite of its resentment of our cool nights; and 'Monica Ann' (Fay), which showed the most wonderful branching for a first-year plant.—*Los Angeles State & County Arboretum, Arcadia, California.*

## HYBRID AMARYLLIS FOR DESERT REGIONS

Mrs. Frank McCown, *P. O. Box 176,*
*Holtsville, California*

Summer is long and hot in this region of the Colorado Desert, near the border of the Mexican State of Baja California, starting in early June and remaining warm until late October. That a plant as seemingly fragile as the hybrid *Amaryllis* could thrive and bloom in this climate, with occasional highs of 115° and 118°F. during July and August, seems a miracle.

The hybrid *Amaryllis* clone 'Holtsville' was originally given as a gift to one resident in the town. She planted it in a favorable location on the east side of her home in sandy loam where it received morning sun and protection from the fierce noon sun of summer and strong west winds of spring and frost of December and January. This one bulb rapidly multiplied and over the years found its way in many other gardens in Holtsville, in Imperial County.

My own interest was sparked when a friend asked me if I had seen the "Red Lily" blooming in a neighbor's yard. This was in August. The fact that anything that could answer the description of a red lily that was blooming in August made me investigate. And there, as my friend said, was a scape with two very thrifty red blossoms, an *Amaryllis*. Bulbs soon found their way in my garden and bloomed the following April (Fig. 31) along with the Dutch Hybrids and again an occasional spike would surprise me during the summer and fall months.

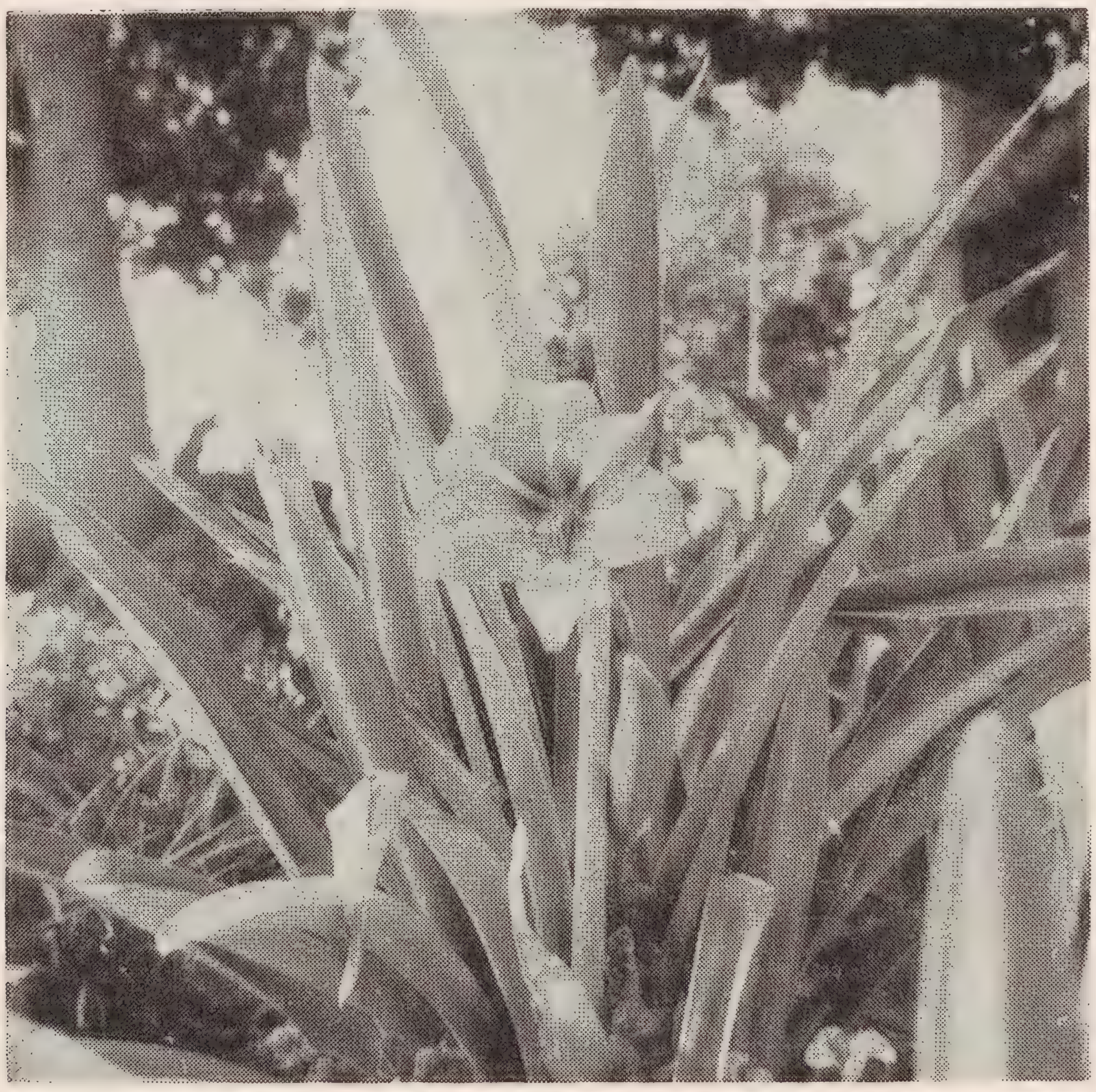

Fig. 31. Hybrid *Amaryllis,* clone 'Holtsville' as grown by Mrs. Frank McCown, Holtsville, Calif., is resistant to high temperature and drought. Photo by Mrs. McCown, 1964.

This vigorous *Amaryllis* Hybrid undoubtedly has quite a bit of *A. aulica* in its background. The flowers, usually two to a scape, are vivid red with a six pointed white star in the throat. Dark maroon shading accents the white star. The broad, rich green, strap shaped leaves sometime reach three and four feet in height and are evergreen. Offsets are rapidly produced.

In the spring of 1962 I made crosses between this clone and the half dozen Dutch Hybrids that grow very well under a Pecan Tree where they receive summer shade and good drainage. In April of 1964 one seedling although quite small bloomed. Very like its 'Holtville' parent in coloring and of only medium size, the only good quality noted was its ability to bloom so young. By the summer of 1965 I anticipate bloom on a good many of the seedlings and in the following year any ability to make offsets and repeat bloom should begin to show up. These two characteristics if they could be combined with the beauty of the Dutch Hybrids, could point the way to a new type of hybrid that would do well in desert regions.

## CYRTANTHUS PURPUREUS

*Cyrtanthus purpureus* (Ait.) Traub (syn.—*Vallota purpurea* (Ait.) Herb. = *V. speciosa* (L. f.) Dur. & Schinz) is an excellent horticultural subject but unfortunately has been much neglected.

Mr. Roy Hansberry, of Modesto, Calif. (Plant Life 18: 145. 1962) has reported on its culture under the title, ''West Coast Vallota Culture''. Since this was published, the genus *Vallota* Herb. has been united with the genus *Cyrtanthus* on biological grounds as indicated in Traub—''The Genera of Amaryllidaceae'' (1963), page 66.

Since *Cyrtanthus purpureus* (under the synonym *Vallota*) is offered by a number of American dealers, and by Ludwig & Co., Hillegom, Holland, the members should obtain bulbs and report in the Year Book on their experiences with this delightful plant subject.—*Hamilton P. Traub.*

PLANT LIFE LIBRARY—continued from page 38.

PHILOSOPHY OF SCIENCE. THE DELAWARE SEMINAR. Bernard Baumrin, Editor. Interscience Publ., a division of John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016. Vol. 1. 1963. Pp. 370. $9.75; Vol. 2. 1963. Pp. 551. $14.50.

The long range purpose of this series is to bridge the growing chasm between the two intellectual cultures of our time—the scientific and humanistic communities.

In Volume 1, the scope of the philosophy of science is presented by sixteen authorities; two basic distinctions; scientific explanation and prediction; philosophical aspects of foundation mathematics, biology, social science, and of physics. In volume 2, nineteen authorities discuss in detail current philosophical developments pertaining to the physical sciences. These volumes are highly recommended.

The volumes to follow on the biological, and social and behaviorial sciences; and the formal disciplines of logic and mathematics, will be eagerly awaited by scientists generally.

THE GEOGRAPHY OF THE FLOWERING PLANTS, by Ronald Good. John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016. 1964. Pp. 518. Illus. $13.00. This third revised edition of an outstanding text is necessitated by the rapid progress made in our understanding of the geographical distribution of flowering plants. After an introduction indicating the importance of plant geography, Part I is concerned mainly with the division of the world into floristic regions with special reference to the bioevolutionary background; the distribution of plant families, genera, and species. Part 2 is devoted to the factors involved in plant distribution —climatic, edaphic, and geographical changes; and to the theory of tolerance. The illustrations are outstanding. This volume is highly recommended.

# 4. AMARYLLID CULTURE

[REGIONAL ADAPTATION, SOILS, FERTILIZATION, IRRIGATION, USE IN LANDSCAPE, DISEASE AND INSECT CONTROL, ETC.]

## THE 1963-1964 AMARYLLIS SEASON

Robert D. Goedert,
*P. O. Box 6534, Jacksonville 5, Florida*

Another *Amaryllis* season has passed. Generally almost all amaryllis flowered late this season. The Dutch Growers experienced some difficulty in setting buds and as a result the bulbs arrived in the United States nearly a month late. Normally the hybrid amaryllis bulbs imported from Holland flower nearly 100% but this season there were more complaints than normal that bulbs did not flower at all. This always results in some indignation on the part of the customer and is one of the factors that plague the amaryllis dealer. There was a marked increase in late flowers this season and now, May 15, spikes are still appearing.

The hybrid amaryllis from South Africa are becoming more popular each season. Many fanciers like to have a few early flowers and the amaryllis from South Africa, being shipped from the southern hemisphere, arrives in early October and can be flowered during November the first season. The South African growers, like the Dutch, maintain a high standard of quality. Most bulbs can be expected to make two or more spikes. These amaryllis show more characteristics of the Warmenhoven Strain which they have used extensively in breeding. The Warmenhoven Strain is generally considered the largest flower strain of the Dutch growers. The Indian and Japanese growers on the other hand use the Ludwig Strain in their hybridizing.

The true Dutch strain hybrid amaryllis can be obtained from India. Almost all are seedlings of the Ludwig Strain. While the quality of the flowers is very good, the growers experience difficulty in obtaining bulb size and the percentage of flower spikes obtained from the Indian bulbs the first year is very low, often not over 20%. Most bulb dealers are discontinuing buying these bulbs for these reasons.

*Amaryllis belladonna* L. (syn. *A. equestris* Ait.) from India is nice small amaryllis and will naturalize well among pine trees in the south where winter temperatures do not fall much below freezing. It also makes a nice pot plant when planted several to a pot. A market for this small amaryllis has failed to develop and few are being imported. *Amaryllis belladonna* L. will set seed and can be used in hybridizing for small flowering sorts if one is interested in this type of amaryllis. The amaryllis ''Gracilis'' from India is both cheap and of good quality but a market for these has also failed to develop. These also make a wonderful pot plant when planted several to a pot. It is hoped that more interest will be shown in the small amaryllis as they merit our attention.

The growing of amaryllis commercially in the United States has decreased while it has increased in other countries. One firm in the Bahamas is now growing an improved strain called the Calypso Strain. The quality of these bulbs is very high both in flower and condition of bulb. These amaryllis are apparently grown under the most ideal conditions and the bulbs are very clean in appearance and they make vigorous growth. The firm at first had much difficulty in getting bulb size and a high percentage of bud set but changes in culture this past season indicate this difficulty is being overcome. They are confident that their bulbs will be as reliable as the Dutch and South Africa bulbs. The amaryllis from the Bahamas being raised in a warm climate under ideal conditions will eliminate any trouble from red blotch often experienced with other bulbs. By harvesting early and pre-treating experiments this season indicate that they can have amaryllis on the market to flower easily by Christmas, as the African and the treated Dutch bulbs do. The bulbs from the Bahamas I have flowered are exceptionally easy to force. The hybrids now offered are mostly red or mixed colors. The firm in the future plans to produce almost all of their bulbs by cuttage; first to be sold by color and later as named varieties. Here as with the amaryllis from the African growers the hybridizer favors the Warmenhoven Strain.

One grower in Hawaii is producing commercial quantities of amaryllis. This past season a number of different kinds were tested. The percentage of flower spikes were exceptionally high. Many bulbs made three spikes and some four. Flower size was not as large as desired; however, many of these hybrids had extra nice color and many new shades of color. Of particular interest were the Dutch and Australian hybrids. This series of hybrids had some extremely beautiful rose shades among them. The Dutch and Australian crosses also appear to be the most vigorous and have the best flowers. It is believed that this firm will devote most of its attention to the Dutch and Australian crosses and develop its hybrid from these seedlings, as an Australian strain.

The amaryllis fan still prefers to buy the named clones. It is believed, however, that with the improvement in quality of the unnamed hybrids on the market more interest will be shown in growing amaryllis. The so-called ''Dime Store'' or cheap amaryllis are disappearing from the market and the medium priced better hybrids will eventually eliminate the inferior ones. Over production of the better hybrids will occur before this market is developed. This is one of the greatest problems of the grower. It creates a flooded market and prices fall below production costs and the good hybridizers give up the ghost. Over production is one of the greatest enemies of the amaryllis grower.

The trend in amaryllis breeding appears to be changing. While the solid colors are still popular more of the two tones and blends and distinctly marked varieties are appearing on the market. This is a welcome trend as it gives character to each clone not obtained with the solid colors. The shades in the colors are also being expanded. This all tends to make these flowers more interesting. I think the hybridizers have neglected type of flower generally and this is especially true with the Dutch. However there is some indication that they are giving this a little more consideration. The new picotee types and the striped varieties show this trend. There are many interesting types of flowers that can be developed particularly with the medium size flowering kinds that should make good cut flowers and worthy arrangement material. Amaryllis are used to some extent in Europe as cut flowers now. We in this country have neglected this use of amaryllis. *I would like to see all members of the Amaryllis Society grow a few flowers each year for this purpose.* Winning a blue ribbon in an amaryllis show is fine but let us make the amaryllis something more than a show flower. It could become more popular than a rose and everyone should either have one in a pot or in the yard. Many people are not interested in shows but I feel each of us can get our neighbor interested in growing amaryllis, at least one, for their own enjoyment. They are a wonderful plant especially as a winter pot plant in the north even if they can not be enjoyed as border subjects.

Getting back to trends in amaryllis. It appears that the hybridizers are recognizing color-types and are breeding to duplicate or improve on a clone that has proven popular. I feel 'Margaret Rose' and 'Sweet Seventeen' are good examples of this. They are very similar—one can argue which is best. These two clones have both been popular. Now Van Meeuwen has a similar clone in 'Loveliness' and another firm has also a similar clone named 'Day Dream'. Other competition is also being developed. Ludwig's 'Love's Desire' is a very beautiful and popular color. Van Meeuwen's new clones. 'Rose Marie' and 'Pygmalion', are very similar. Another firm has introduced 'Rosy Dawn'.

'Apple Blossom' is an exception to this trend. It appears that it has been accepted as a standard and almost all are raising it under its registered name. It is a very nice color shade and a vigorous grower, a fine amaryllis and will be around a long time. Other clones I am sure, will be recognized as standards and will be grown universally.

The new clones on the market this past season were not numerous. Possibly the most noteworthy was Van Meeuwen's 'Siren of Paradise' and 'Pygmalion'. 'Siren of Paradise' is an extremely tall flowering white with just a pencil stripe of red in it. It is also rather large and a most impressive amaryllis. It will compete with 'Marion' and 'Peppermint' both of the same type. 'Siren of Paradise' will make a wonderful show clone. I understand it is very difficult to propagate so it may be discontinued. Those who are fortunate enough to get it will find it a wonderful clone.

'Pygmalion' is similar to 'Love's Desire' and also possibly the best substitute for 'Little Diamond'. It is pink and white, very beautiful and a most free flowering and vigorous growing clone.

Ludwig's new, 'Beautiful Lady' and 'Heaven Sent' caused quite a bit of comment. 'Beautiful Lady' is a new salmon, said to be an improved 'Bouquet'. It has to be good. 'Bouquet' has proved to be an excellent clone. 'Beautiful Lady' and 'Rilona' are outstanding new salmon clones.

Ludwig's 'Heaven Sent' was well received and caused a lot of comment. It is a beautiful new light shade of rose pink. Many rave about this one.

Though the season was marked by late flowers, generally the quality of flowers was good. I watered my potted plants much too early in the season which caused more leaf growth and reduced flower sizes but generally I got a good percentage of flowers.

The following is my observance of the past flowering season. If I do not mention your favorite clone please remember this is an informal discussion, and I can not cover all of them and could just forget to comment on the one you like best or I may have neglected to observe it.

### WHITE HYBRIDS

The white amaryllis are always popular particularly with the beginner. While Warmenhoven's 'Oasis' is considered tops by many that have it, Van Meeuwen's 'White Christmas' has much greater distribution and nearly always is liked. I have had many say it was absolutely tops in performance. It gets rather large, is very free flowering and I have had claims from several sources saying it will flower several times a year. One lady, I believe, said she had six spikes on her bulb during the past year! 'White Christmas' is exceptionally free flowering and a wonderful clone. It is easily forced and can be classed as one of the better amaryllis regardless of color. Van Meeuwen's new white, ''Mont Blanc'' (will have to be renamed as Warmenhoven already has a clone with this name), is larger than 'White Christmas'. It is considered mainly a show flower and appears to be becoming very popular.

Ludwig's 'Christmas Gift' and 'Winter Carnival' are both fine whites and continue to be popular. The older Ludwig white, 'Marie Goretti' and 'White Giant', are still going strong. 'White Giant' will make a nice size flower from a small size bulb which should be of interest to the florist. 'Nivalis', although a poor commercial variety, (it rots easily in shipping) does very well in the border in the south. It is a good standard white and one of the best for outside planting.

'Overture' appears to be a white of merit. It grows tall and makes a flower similar to 'Ludwig's Dazzler'. It is fairly vigorous and many will favor it. 'Joan of Arc' and 'Leading Lady' are free flowering whites. Warmenhoven's 'Mt. Blanc', a very old clone, is very reliable and can be maintained in flower for many years. It is a good white. Many consider it at or near the top.

'Flying Cloud' is a good standard white. It is becoming more popular each year and will eventually be considered one of the better standard whites due to its free flowering and vigorous growing habits.

### NEAR WHITES

The near whites or whites penciled red are becoming popular. 'Siren of Paradise' was added to this list the past season. It is a very tall large flowering clone and a fine show flower. It will give 'Marion' and 'Peppermint' strong competition. 'Marion' may flower larger than 'Siren of Paradise' but it grows much shorter and is less spectacular when placed beside a 'Siren of Paradise' on a 30″ to 36″ spike that looks down at you. 'Siren of Paradise' *also has a delicate fragrance.*

### RED WITH WHITE STRIPES

The red and white striped clones have never been very popular but with each improvement they are gaining favor. 'Streaking Stripes' is no doubt the most outstanding (in my opinion). It has beautiful form, *is fragrant,* and has a lot of green in it which really adds beauty to this amaryllis. Green in amaryllis has in the past been regarded as undesirable but one look at 'Streaking Stripes' will, I am sure, change your mind. 'Zenith' is still popular in a number of areas and Warmenhoven's 'King of Stripes' and older smaller flowering clones are finding favor with many who are turning to the medium-sized flowers as they are more dependable bloomers. Ludwig has several new striped clones. Their value will soon be determined. I feel a striped clone has to be different or very outstanding to be a success. Ludwig must consider the two tones or stripes are going to become more popular by the number he is introducing.

### BI-TONE—RED AND WHITE

The bi-tone, red and white, series may be weak growers. 'Five Star General' was a most outstanding flower but propagation difficulties has just about eliminated it and one seldom sees a good flower of it. Its bright red is sparkling. In most similar clones the color is not as intense and is generally dull looking. 'Aphrodite' is a new red and white that is reasonably good—not as fine a color as 'Five Star General' but nice. 'Piquant' has nice coloring, much the same pattern as 'Candy Cane', but of a medium red and white rather than the orange-red and white. It has been seen by only a few people. It is, however, a worthy clone and deserves more attention. Ludwig's 'Happy Memory' is a nice new red and white. Named in honor of the late Mr. & Mrs. C. J. van Til, General Manager, and his wife, director and principal shareholder, of Ludwig & Co., who lost their lives in an automobile accident in 1961. See also page 25, PLANT LIFE, 1963, for brief In Memoriam notice. We will have to be happy with these until someone develops a new 'Five Star General' that will grow vigorously.

### WHITE, FLUSHED PINK

The white flushed pink clones are becoming very popular as in this coloring we have our nearest true pink color. The solid colored clones are more rose pink. 'Apple Blossom' is the most popular white flushed pink clone and is being grown by many growers. In my opinion it is not as refined a color as desired, it is surely a vigorous grower and the coloring appeals to almost all people. It will be a leading commercial clone for an indefinite period.

### PINK

‘Little Diamond’ is the nearest to a solid pink—a pin striped pink and white that appears pink. It is very flat and has perfect round form and is relatively large. Without a doubt it is considered to be the nearest pink and a leader in this particular color. It really has class. Being high priced and scarce it is considered a collector’s item and few have seen it.

‘Pygmalion’ approaches the coloring of ‘Little Diamond’ but has more white in the throat. When raised in the shade it is a delicate pink and white color. It flowers easily and I predict that it will become extremely popular as it has all the makings of an excellent clone. ‘Love’s Desire’ is a good white and pink clone with more pink than ‘Apple Blossom’. Two new clones, ‘Rose Marie’ and ‘Rosy Dawn’, are very similar. All are good and time will tell which is best. This is a color that is becoming extremely popular and will possibly become more popular than the solid rose pinks. The Hadeco African clone, ‘Pink Blush’, is about half way between ‘Apple Blossom’ and ‘Love’s Desire’. Some may call it an improvement over ‘Apple Blossom’ as its color is more refined. It is large, grows vigorously and is a very beautiful clone. It ships poorly so may never become popular. ‘Rosaline’ is brick rose and white. The color is a little odd and it did not flower as well as usual this past season. It normally flowers easily and is distinctly different in color. I should not forget ‘Pink Beauty’ as it is a beautiful rose red and white that is extremely popular.

‘Beacon’ still reigns supreme in the salmon pink and white bitones. It has no equal.

### BLENDS

In the blends ‘Floriade’, white flushed pink, is one of the most popular. Its companion, ‘Golden Triumphator’, is a golden bronze shade. It is also large and beautiful. ‘Golden Triumphator’ has taken on more color the past several seasons and often flowers near solid golden bronze with little white in it. ‘Golden Triumphator’ is still considered one of the most beautiful amaryllis by many and is good in hybridizing as its seedlings make robust plants as a rule. ‘Pinksterflower’, a blend of azalea pink (salmon orange) and white is a strong grower and a fine clone. ‘My Fair Lady’, a new color in red and white blends, is a most beautiful and different flower. Almost everyone who sees this amaryllis falls in love with it. In the lighter shades ‘Margaret Rose’, ‘Sweet Seventeen’ and the two new ones in this color, ‘Loveliness’ and ‘Day Dream’, compete for first place. In my opinion ‘Day Dream’ may be the best. It has wider tepalsegs and is a very fine amaryllis. Of course it has not withstood the test of time as have ‘Margaret Rose’ and ‘Sweet Seventeen’. ‘Cupido’ is a new one that is a little different in color. It is more old rose and white. It grows tall and vigorous and has a rather interesting color combination.

### SALMON

There are few amaryllis of merit but this color has some of the most outstanding amaryllis in it. 'Bouquet' has been among the best for a number of years. Van Meeuwen's new 'Rilona', a light salmon or salmon buff, is a most vigorous clone. It is lightly bearded which makes the flower very beautiful with a delicate ruffling effect. Ludwig's 'Home Decorator' has had a most unique color in the salmon shade being a bronze salmon. This is a new color in amaryllis which is a popular color at the present. 'Beautiful Lady', considered an improved 'Bouquet', is a most beautiful and worthy addition to this color. I do not see 'Beautiful Lady' competing with 'Bouquet' since 'Beautiful Lady' is solid colored while 'Bouquet' has a purple or violet midrib which, in my opinion, makes it distinctive. 'Queen's Page' is still popular among salmons. Generally the Warmenhoven bulbs are higher priced and do not have as wide a distribution as the Van Meeuwen and Ludwig clones. The bulk of Warmenhovens trade is still in unnamed clones. The other growers have named almost all of theirs.

### ROSE PINK

In the solid rose pink clones, Ludwig & Co. until recent years were the only contenders. However, almost all Dutch growers produce clones of this color now. Of all of these I have grown I liked 'American Fashion' best. This is very reliable and beautiful. Unfortunately this clone was difficult to propagate and Ludwig & Co., discontinued it.

If I were to name the one I thought was the next best I believe I would have to say 'La Forest Morton'. There has been lots of discussion of the merits of 'La Forest Morton' but if its performance is anything consistent with that of the past season I have great faith in it. It is large, has delicate ruffled edges and is a very pleasing lavender rose pink. Van Meeuwen's 'Queen of Sheba', is fine. It has only one fault. The tepalsegs are so wide they tend to cup and do not allow the flower segs to reflex properly, a very fine clone otherwise. Ludwig's 'Flora Queen', is excellent. It, however, is very scarce. It is a light lavender rose pink and possibly the lightest color in this group. The new clones, 'Dutch Belle' and 'Heaven Sent', are worthy additions in this color. 'Catherine Valenti', 'Bellini', 'Dawning' and 'Fanny', are all nice clones, but being higher priced have not been evaluated to an extent. 'Fanny' is a new color in lilac pink and is very beautiful. Its color is much like 'Daintiness' except the color shade is different. It has a green heart as in 'Daintiness'. All who have seen it have commented on its beauty and different color.

### ROSE RED

In the medium rose red shades the leader is possibly 'Bella Vista', a fine free-flowering medium rose red. 'Doris Lillian' is still popular. It is, however, being replaced by such clones as 'Queen of the Pinks' which is similar but larger flowering. 'Symphony' is still very popular. The new 'Trixie', has excellent color and is finding many friends.

In the dark rose reds Warmenhoven's are still the only ones available and all three are fine amaryllis. 'Bordeaux' is the darkest, 'Moreno' and 'Mysterie' being lighter but of different form.

### ORANGE

There are not many amaryllis that approach the true orange color. 'Delilah' is the nearest to orange in my opinion. It is a fine amaryllis and possibly in a color class all its own. The new amaryllis 'Orange Orchid' is beautiful and outstanding. It has coloring similar to 'Orange Wonder' which has been very popular the past several years even though high priced. Anyone who likes orange amaryllis will like 'Orange Orchid'. 'Prince of Orange' is another fine tall orange amaryllis. The small Hadeco African amaryllis, 'Tangerine', is an excellent medium sized flowering amaryllis. It still is a grand performer. 'Terra Cotta' and 'Orangedale' perform well also.

### BRIGHT RED

There are but few bright red amaryllis. This is a color I like but even I neglect. 'Red Emperor' and 'Red Star' are the only ones I can think of in this particular color at the moment. I do have several unnamed clones in this color that perform beautifully each year. I do not know why this particular color shade has been neglected but we should pay more attention to it.

### MEDIUM RED

I think the medium reds as a whole are not a strong lot. Possibly the best one to date is 'Flambouyant'. This amaryllis has just about perfect classic round flat Dutch form. It is an eye catcher. 'Red Champion' is larger and a very fine amaryllis. These two possibly lead the pack. W. S. Warmenhoven's 'Scarlet Triumph' is large and leathery and fine. 'Ludwig's Scarlet' is large and fine, but its popularity seems to be on the wane. 'Ludwig's Goliath' is popular as it is huge. It has been scarce so has not been properly evaluated.

### DARK RED

Everyone wants a good dark red but I find no one fully satisfied with those available. Possibly we would like for them to be darker. 'Mars' seems to be the new one that is most popular. Some however report it hard to flower while others report excellent results and huge flowers six to a spike. The best results seem to be obtained in California. I do not know why. My results in Florida have not been the best. 'Mars' can be spectacular. Warmenhoven's clone, 'Rotterdam', is making friends and is a very nice amaryllis. 'Ludwig's It' and 'Franklin Roosevelt' have many friends. 'Ludwig's It' at times flowers in the orange shade but this last year was a beautiful dark red.

### WINE RED

There are several that belong in the wine red group. 'Red Master' has led this pack for years. While it is still popular it has not flowered as well the past few seasons. 'Alcyone' and 'Tristan' are good and still popular. 'Purple Queen' is considered by many as the best in this color.

### ORANGE RED

I note in my discussion that I have left out the orange reds. If I were to pick a leader in this color it would be 'Rembrandt'. This one grows tall and flowers easily. The bloom is large and flat. At this moment I believe I would class this as one in my list of ten best amaryllis. 'Agatha', 'Apollo', 'Madame Curie' and 'Orange Nassau' are all beautiful and outstanding. Few are available and they remain collectors items. Anyone who has one of these in his collection is very proud of it. 'Cavalier' is a very large new orange red that deserves attention.

### PICOTEES

No amaryllis fancier should be without a few of the Picotee type amaryllis. They are very artistic, of airy form, and very beautiful. Ludwig has had two named clones, 'Dutch Doll' and 'Square Dance'. Both were white with a very narrow red edge on each tepalseg. 'Square Dance' was light and airy with an informal form. Tepalsegs were not extremely wide. 'Dutch Doll' on the other hand has fairly wide tepalsegs. 'Square Dance' proved to be a poor shipper so it is being discontinued and replaced by the new 'Petticoat'. The unnamed clones sold as Picotee show quite a bit of variation in form and color some are being almost white while others are speckled and flushed red. All are beautiful and worth your consideration.

### HADECO HYBRID AMARYLLIS

In evaluating the amaryllis I tend to forget the Hadeco African clones. These are raised from offsets so that one can expect them to multiply once they are planted in the border. To date the color range in these is not as wide as desired but each year some 10 new clones are evaluated so that eventually a complete color range will be available.

The first Hadecos named clones introduced were orange red. 'Orangedale', 'Terra Cotta' and 'Tangerine' in this group are all nice standard clones. There are now a number of good reds available—Clone 65, 'Firebrand', 'Red Rover', 'Redstone', Red Wing', and 'Ruby Glow'. All are of different color shading and some are of a particular shade of red not obtainable elsewhere. Not all of these are registered but it is planned that they will be by flowering season. Clone 236 and 'Rosedale' are very beautiful rose red clones, a little different shade than found in the Dutch strain. For early flowers the first year the hybrid amaryllis from South Africa are most worthy.

### AMARYLLIS SPECIES

So much for the named clones, I have been interested in the species for some time and have a considerable investment in them. My interest in them is their evaluation in view of developing new forms, colors, sizes and growing habits. It appears when the flowering season draws near each year I am the busiest and fail to take proper notes on those I have and have completely neglected to take pictures. Fortunately Mr. Sam Caldwell has a number of species I have collected and he has taken pictures of some of the species as *A. auclca stenopetala* and *A. aulica* *playtypetala* as published in the 1964 Year Book. Many people have obtained bulbs of the different species I have collected and I am quite sure your Editor would appreciate any pictures you might have of these when they flower. Send a copy of any of these you may have to your Editor.

Of the 40 to 50 different wild species lots I have collected a few have failed in culture, and have been lost. Many others will reach maturity this coming year and I do hope to find time to record the results.

This past season some flowered that had not flowered before. The one that most impressed me was a spike on species recorded as SA-5-60.

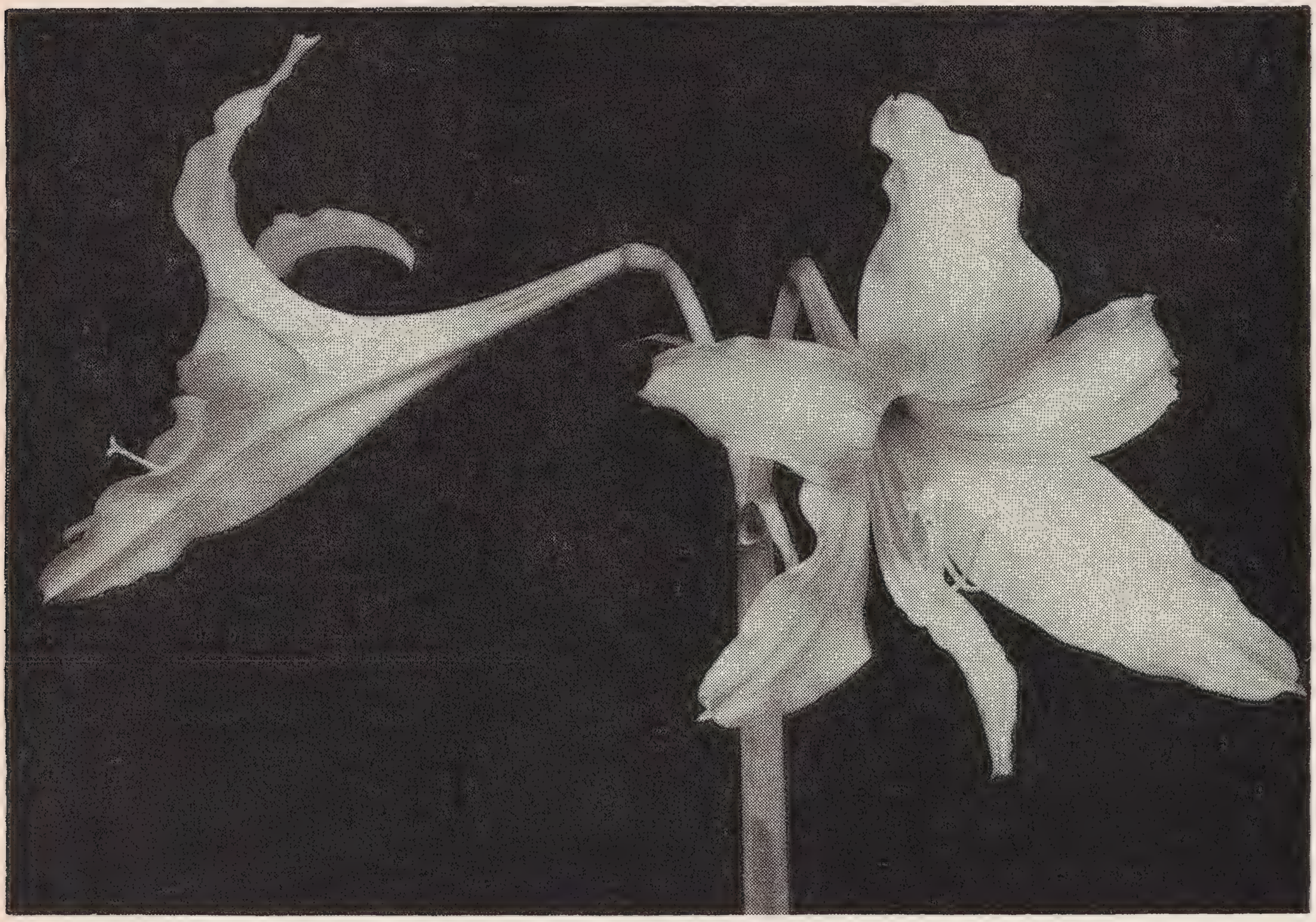

Fig. 34. *Amaryllis striata* Lam.; SA62-5, Rio de Janeiro, Cordeiro, Brazil, in the wild, flowering in September (southern hemisphere), alt. 830 m.; average temperature, during growing season, 25° C. (=77° F.), in half shade; subsurface drainage. Collected for Mr. Robert D. Goedert by paid collector. Photo by Sam Caldwell of plant growing at Nashville, Tenn., without leaves at flowering time.

This bulb, about 1″ in diameter had a spike about 10 inches tall with two flowers about 2½ to 3″ in diameter. The flower was orange red with a yellow star in the throat and a very dark solid purple deep in the throat. The color was very clear with little or no striping. I had a notation on this bulb that it appeared different from the others in the lot so it may be a single odd bulb. The remarkable part of it was that the yellow in it was *a true yellow* very clear and the purple was vivid purple and no trace of any other color. The purple looked like someone had poured indelible ink deep in the center and made a blotch about ½ inch in diameter. As usual I was very busy at the time and did not get a picture.

I had several in the striata group. Possibly the most outstanding was SA62-3. This is a beautiful pastel pink blending to yellow with green deep in the throat. It is of airy form, possibly *A. striata crocata.* This species grows easily and should be useful in hybridizing for pastel shades. This species was gathered in Espirita Santo, Brazil and grows on rocks in full sun. Also in the striata group, SA62-5 flowered. This is a very tall reddish orange with a yellow green to white striated flower (see Fig. 34). This is a fairly regular form and is possibly *A. striata* var. *striata.* Another species, SA63-22 from Santa Catarina Island, Brazil, produced a small solid orange-red striated flower. This has a typical striata leaf and bulb growth and is very similar to the striata Mr. Hana found naturalized in Hawaii but is smaller and darker in color. It is believed to be *A. striata* var. *striata.*

One species that flowered this year for the first time was sent in as *A. blumenavia.* This is species No. 12/62. One flowered this spring—a relatively large flower over 5″ in diam., of crimson veined more deeply. The flower was compressed laterally. It appears to be the species *A. correinsis* var. *compressa.* This flower has amazing ability to catch the moon light and literally glows in the dark. I would assume it is pollinated by some night flying moth. It grows poorly for me, appears to belong to the aulica group wanting cool weather to grow but appears to want this coolness during the summer months as it apparently goes dormant much above 70° or below 60° F.

Species LM63-1 from San Martin, Peru is a worthy species being bright medium red with whitish-green throat. It resembles *A. belladonna* but is more trumpet shaped. It is a clear red with little or no yellow in it. In this group of bulbs there are some that are similar but the color is pink. As this species has little or no yellow in its coloring, I feel it may lead to a new series of hybrids of pure pink color as well as hybrids of bright red. This amaryllis surely deserves the attention of the hybridizers.

Another species that flowered was SA62-1, from Esperito Santo, Brazil. It was a very regular flat formed amaryllis in rose pink with white heart and appears to belong in the belladonna group. SA62-2 from the same area is very similar. The foliage on these appears very similar, however SA62-2 rots easily during warm wet spells whereas SA62-1 seems to like this condition.

Next season I should have a number of new species to flower. Many of these do well in North Florida and should prove good in hybridizing. May I suggest in your hybridizing that you use *A. aulica platypetala* as a seed parent. This past seasan I flowered several crosses between 'Floriade' and *A. aulica playtypetala.* These hybrids appear to be robust growing. They are late flowering—a month later than most hybrids. They produce very large flowers. The flowers were striped, very interesting and beautiful. This particular cross produced salmon, orange red and rose shades. This is a very interesting and worthwhile cross that anyone might try if he wants some amaryllis that are different from those of his neighbors.

# VEGETATIVE PROPAGATION OF AMARYLLIS FOR AMATEUR GARDENERS

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Elsewhere in this issue is an article in which I have endeavoured comprehensively to describe a particular method of vegetative propagation of *Amaryllis* by specially designed incubators. It is not only a cumbersome operation, but also a method involving the outlay of money for the building of equipment which would normally be entertained only by the commercial grower, since the installation of such units could not be justified other than for reproduction of established and proven clones intended for large-scale distribution. This naturally, is not the function of the home gardener who, moreover, would much more wisely spend money on the acquisition of one or a limited number of ramets in a larger range of popular and attractive new clones.

There are many home gardeners whose pride it is to exhibit blooms at their local Amaryllis shows—and quite rightly so. And then it often happens that a keen enthusiast is unable to enter his choice clones, for the reason that the single ramets of many of them have flowered too early, whilst the blooms of others are not yet properly developed for exhibition. Such a predicament could, more often than not, be overcome by having a few ramets of each clone with staggered blooming cycles. This applies particularly to those who have a greenhouse or bedding facilities to accommodate a few of each clone, with room to spare for the addition of attractive or newer ones which may catch the eye.

It will be found that many of the exhibition clones are slow in natural increase and it often takes a number of years before offsets are produced. Then there is a further period of waiting for these offsets to advance to the stage where they may safely be detached for transplanting. This slow process of natural increase can be easily and speedily stimulated by human aid with a method that calls for nothing more than a bit of skilful handling. Not only is the operation a very simple one but, furthermore, it does not entail any special apparatus and can be applied on a small scale by any one, even with restricted space.

Let me disclose at this stage that the method of vegetative propagation, which I shall attempt to describe as fully as possible in the following paragraphs, is by no means anything new or revolutionary. Whilst I may perhaps introduce a few innovations as far as accepted procedure is concerned, it is a practice which has been in vogue for such a long time that I cannot correctly remember when I first learned about it (see Traub, "The Amaryllis Manual, 1958"). It was definitely very many years before I ever heard of the cuttage method. In addition, it has been written about extensively in horticultural journals and, for all I know, articles on the subject may have been published in back numbers of the Year Book.

### TIME OF PREPARATION

The best time for the operation, as in the case of cuttage referred to in the concluding paragraph of the other article which follows, is when the bulbs have reached the peak of dormancy and just prior to the commencement of new seasonal growth.

### CHOICE OF BULBS

One would, naturally, select for propagation a bulb of a clone which one wishes to increase. That goes without saying. However, do not use a young bulb that has not yet reached a full state of maturity. The best results are obtained from fully matured large bulbs with well developed basal plates. Vigour of growth is a determining factor and, therefore, the weaker bulbs with smaller chances of survival against laceration, mutilation and further rough handling had better not be subjected to the treatment involved in the process of preparation.

### TOOLS, EQUIPMENT, ETC

The first requirement is a large-sized flower pot to provide sufficient space around the bulb so as to allow for growth and development of young bulblets. With this will go drainage material, regular potting medium and sharp coarse and well washed river sand.

A sharp thin-bladed knife is required with a length of blade somewhat exceeding the diameter of the bulb.

The most suitable instrument for scooping out the hole in the basal plate of the bulb is an ordinary metal teaspoon. Here I would advise the use of an old spoon which may be discarded without any sense of great loss. Sharpen the edge of the teaspoon all round with a fine file or on an emery wheel so that it will cut cleanly into the bulb.

Thin wooden wedges are required to act as spacers for insertion into the cuts in the bulb. The ideal wedge is cut from a wooden spatula such as a doctor uses for pressing down the tongue when examining one's throat. Wedges about 3/4″ wide are cut to a suitable length, depending on the diameter of the bulb.

A basin containing a medium strength solution of permanganate of potash should be kept handy.

Lastly, provide a fungicide in powder form and for this I would recommend copper sulphate.

### TREATMENT AND PREPARATION OF BULB

The bulb is lifted in the normal way with care to avoid unnecessary bruising. The roots are cut off flush with the base, decaying matter usually attached to the basal plate of freshly lifted bulbs is removed by gentle scraping and all soil and extraneous matter are removed by thorough washing and rinsing. The bulb is then emersed in the permanganate solution to ensure proper disinfection. By these means, the hands will also become disinfected. Subject the knife, the spoon and spatula wedges to similar treatment.

Now remove leaf growth, if any, by cutting off the top of the "neck" of the bulb. The next step is to level off the bottom end of the basal plate with the knife. Be careful not to remove too much, but only sufficient so as to provide a flat face which will enable you to start scooping out the basal plate from its centre, i.e. at equal distances from the outer rim of the basal plate. The sharp-edged spoon is used for this operation. The hole, which is eventually dome-shaped, must be neither too wide or too narrow. It should have a surrounding wall of basal plate of about 3/8″ thick. The depth of the hole depends on the depth of the basal plate, but this does not vary much with mature bulbs. Nevertheless, scoop out to a depth of about 1½″ beyond the basal plate right into the pulpy matter of the bulb.

The bulb is now stood on its neck with the basal hole upward and the knife edge placed across the centre of the hole. Then cut to a depth extending about one third of the bulb. The second cut is made similarly, but at right angles across the first. These four sections are all likewise halved and the operation is once more repeated so that ultimately there are 16 cuts, all to the same depth. Care should be taken to cut straight vertically.

It will now be found that all the cuts have closed up automatically and this is where the use of the wedges comes in. If necessary, sharpen the points of the wedges—not like a pencil, but in the fashion of a chisel. Dip the wedges in the fungicide and insert them in the cleavages at the point where the outer scales attach to the basal plate. This operation is sometimes tricky on account of the closed up cuts. But by exerting pressure from inside the hole with the fingers, the cuts are forced open and the wedges more easily inserted. By experiment, I have found that unless the cuts are wedged open, the wounds appear to knit and development of offshoot bulblets is negligible. After wedging, semi-loose scale segments, which soon start decaying in the ground, are removed and the bulb is then dusted with copper sulphate powder to minimize the danger of fungus infection. The bulb is now ready for planting.

### PLANTING

Even more so than in the case of ordinary bulbs, the need for effective drainage cannot be over-emphasized. The pot must be provided with a drainage hole at the bottom. First place a layer of drainage rubble at the bottom of the pot and just cover this with coarse sand. Now fill up with regular potting medium to a depth at which the basal plate would normally be placed in ordinary potting. A mound of damp clean sharp river sand is placed in the centre of the pot on top of the potting medium. Fill the hole in the bulb with damp sand and place it on the mound of sand in the pot, pressing in slightly, but not so much as to press the basal plate through the sand into the bottom potting medium. Heap some more of this sand around the bulb up to the terminals of the cuts. The pot is then filled up with potting medium to the normal height. I usually fill it up to the shoulder of the bulb with the entire neck above the soil. The pot is then given a normal watering.

### AFTER CARE OF BULB

To induce rapid growth, the potted bulb should be placed in a warm sheltered location with plenty of sunlight. Direct sun rays during the heat of day should be avoided, although early morning and late afternoon sun is beneficial. Having regard to the fact that all roots have been removed, the bulb cannot ''drink'' water in a normal manner and, as in the case of incubator segments, the medium should be kept moist regularly, but not wet as in the case of a growing bulb. Overwatering during the period prior to development of young offsets will almost certainly cause complete rot. This development is a lengthy process and will try your patience. Bulbs also vary greatly in nature so that some may produce their young ones long before such signs are evident with others. Root growth develops simultaneously with the forming of new bulblets and this will be an indication when watering should progressively be increased. At a later stage, when there is no more doubt about the development of root growth on the young bulblets, periodical liquid fertilizing is recommended.

An experienced eye will readily determine when it is time for the removal and transplanting of the offsets. This stage is normally accompanied by signs of overcrowding, especially in bulbs with a tendency to multiply rapidly.

### REMOVAL AND TRANSPLANTATION OF BULBLETS

Eventually the bulb will be ready for lifting and the detachment of its ''chicks''. Here again it will be found that the use of the knife is called for. Further mutilation of the bulb will be inevitable and care should be taken, wherever possible, to perform the dissection in such a manner as to ensure the attachment of a section of the mother basal plate to each bulblet, except in cases of obvious advanced weaning. It will be necessary to operate very delicately and not to damage any of the tender root growth. It is advisable to treat all freshly cut surfaces with fungicide.

### PLANTING AND AFTER CARE OF BULBLETS

The young bulblets must be planted immediately after removal and should, in the process, be protected against wind and sun. If they are left lying about carelessly, the root system will be damaged and further natural growth seriously retarded. It will, therefore, be necessary to have the new pots or beds in readiness immediately to receive the bulblets after detachment. For further information on the planting medium and after care of bulblets, please refer to the following article on the Buller incubators.

### GENERAL REMARKS

It is only natural that one would be very chary in attempting these serious operations on precious clones of which one has no duplicates, although, in fact, this article is actually intended for that very purpose. However, the method of propagation described herein may first be tried out and put to the test with inferior bulbs, the loss of which would not entail any serious hardship. This will also provide the operator with sufficient experience and confidence later to apply the method to more worthy clones. After all, it will only be a question of waiting for one more season before taking bolder steps.

Be assured, though, that I have not yet lost one single bulb that I have subjected to this treatment, in spite of the fact that some clones gave me only very few offsets compared with others which were prolific. Likewise, some bulbs are by nature inclined to develop their young ones earlier and more rapidly than others. I have had as many as 37 offsets from one bulb and as few as 4 from the most stubborn.

The insertion of 16 wedges calls for patient and dexterous manipulation of the bulb, entailing appreciable expansion of wall around the hole, i.e. the surrounding slit shell of basal plate and scales. Should this procedure be found too cumbersome, I would suggest that, after quartering, the four sections be further divided into only three sections each, giving a total of 12 cuts.

After scooping and cutting, the possibility that a bulb will produce a bloom is exceedingly remote. Should, however, this miracle occur, it would have a most devitalizing effect on the bulb and the flower bud must be removed immediately after emergence. Most likely this warning is superfluous, because I have never yet seen a bud on even the most robust bulb after having been subjected to such severe mutilation.

In conclusion I take this opportunity of extending my best wishes for a successful season to all my readers and my warm regards to the many friends whose kindness during my last visit to your great country is always remembered.

# VEGETATIVE PROPAGATION OF AMARYLLIS WITH BULLER INCUBATORS

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## INTRODUCTION

The principle of the particular method of vegetative propagation applied by me during the past fourteen years is not one which I have invented or evolved. It was the outcome of research and experimentation by the late A. C. Buller who, at the time when I met him in the late forties, was under the impression that he was the only person in the world who practised such propagation with equipment scientifically designed for the purpose. No doubt, the units designed by him were unique and, even at the present moment, their construction and method of operation are most probably unknown to many.

In a previous article, I referred to these units which Mr. Buller called "Incubators" and I propose to continue the application of this term. At the time when Mr. Buller intimated to me his intention of giving up the breeding of *Amaryllis* and requested me to continue from the stage where he retired, he not only made available to me the cream of his collection which he and I jointly and severally selected, but he also let me into his jealously guarded details of vegetative propagation.

I read in the 1963 Year Book that after his death, the residue of Mr. Buller's collection was acquired by some horticulturists in the Cape. It is only reasonable to assume that those horticulturists for whom this privilege is claimed also acquired Mr. Buller's incubators or, at least, the knowledge of the method of their construction and operation. Besides, vegetative propagation of *Amaryllis* has been practised all over the world for very many years—since the 1930's (see Traub, "The Amaryllis Manual", 1958, for a summary).

Although I am a commercial breeder and grower of *Amaryllis,* I am not prompted by fear of competition to keep any specialised knowledge to myself. In fact, I welcome competition since not only I but the whole of South Africa and my overseas friends know what I have, what I have done during the past sixteen years and what I am still doing in the continuous improvement of South African strains and their public introduction.

Apart from the foregoing, it is my sincere conviction that any person with specialised knowledge who lays claim to being a true horticulturist, should not adopt the "dog in the manger" attitude, but should share his knowledge with his fellows. If everybody had selfishly guarded his knowledge, the establishment of an organisation such as the American Amaryllis Society would have been ineffective and the publication of the Year Book a fruitless effort. Hence this contribution!

### THE INCUBATOR UNIT

The incubator was designed at a time when there were no rural electricity reticulation schemes in operation in South Africa and it was, therefore, a fuel burning unit heated with a kerosene burning lamp. Such was the nature of the incubator to which I was introduced and, apart from various improvements, including thermostatic heat control, I have not attempted to redesign it for electrical operation. Moreover, I have eight units in operation and they are so successful in their present operation that I have no intention of installing electric elements.

The complete unit, which stands on a simply constructed table of any suitable design—Fig. 36 (V)—comprises three major component parts, viz:

BOX—Fig. 35 (I); WATER PAN--Fig. 35 (II)—and MEDIUM PAN—Fig. 36 (III). In addition to these three components, reference will further be made to various accessories which will be separately described.

*THE BOX—Fig. 35 (I).* The box itself is an open-topped shell enveloping the vital components (water and medium pans) and it provides cavities at the bottom and on all sides of the two pans for the insertion of insulating material. It is 17″ deep, 48″ long and 28″ wide. Its construction is of 24 gge. galvanised flat sheet and, for the purpose of rigidity, the upper rim is rolled round a 6 gge. wire bent in a rectangle of the same inner dimensions as the box.

On the 28″ side, which is the front of the box, there are two circular holes of 2½″ diameter to accommodate the open ends of the heater flue pipe of the water pan, i.e. the heat intake end and the waste gas escape end. The holes, measuring from their outer rims, are 3″ above the bottom of the box, 7½″ from the corners of the box and are spaced 8″ apart.

Since the bottom of the box has to be covered with insulating material which would be squashed flat by the burden of the water and medium pans, it is necessary to lay two parallel pieces of timber, 3″ wide x 2″ thick, along the length of the bottom of the box in line with the holes. These supports are, in any case, necessary so as to ensure that the flue ends of the water pan are held on a proper level to pass through the holes in the box.

*THE WATER PAN—Fig. 35 (II).* The open-topped water pan which is 7″ deep, 44″ long and 23″ wide, is constructed of 22 gge. galvanized flat sheet. On the 23″ side, i.e. the front end of the pan and 1″ from its bottom, two similar circular holes of 2½″ diameter spaced 8″ apart are provided through which the two ends of the flue are to pass. The flue, in the shape of a U, is also made of 22 gge. galvanised flat sheet just like a rainwater downpipe. The outer curve of the U passes about 5″ from the back wall of the pan whilst the open ends protrude 2¼″ in front, permitting an external protrusion of ¼″ through the holes in the box when the pan is placed in position.

The water pan must, of course, be soldered water-tight at all seams and joints, including those around the flue where it passes through the holes at the front of the pan. The bend of the flue need not be half circular but may be rectangular in construction and should be supported by soldering a stay or bracket from its underside to the bottom of the pan at the back end.

When correctly filled, the pan will have 1″ water below the flue pipe and the level of the water should also be 1″ above the flue. This means that the pan is filled to a depth of 4½″ and should constantly be kept at that level, with a space of 2½″ between the water level and the rim of the pan. For the purpose of checking and regulating the water level, a metal dip stick 21″ long with a notch 4½″ from the bottom must be provided, since there are no other means of determinnig the water level when once the unit is assembled and in operation. I did not find it necessary to show a diagram of the dip stick which can be made of ⅜″ round steel.

*THE MEDIUM PAN—Fig. 36 (III).* This pan which is 9″ deep, 45″ long and 24″ wide is also made of 22 gge. galvanised flat sheet. It is open at top and bottom and the latter is provided with a metal screen on which the medium rests. At the bottom end, on the inside of the pan, it is fitted with an exact fitting rectangular steel frame constructed of 1″ x 1″ x ⅛″ or 3/16″ thickness equal angle iron, to provide a protruding 1″ flange on all sides around the inside of the pan and 1″ from its bottom end. Along the bottom 1″ of the pan the other side of the angle iron, i.e. the vertical side, is secured by riveting or spot-welding to the sides of the pan.

When fitted on top of the water pan which is 1″ smaller overall, the bottom end of the medium pan will overhang by 1″ on all four sides around the water pan. The one side of the angle iron frame (vertical side) will form a loose-fitting collar around the brim of the water pan, whilst the other side (horizontal side) is the flange which rests on the rim of the water pan and holds the medium pan firmly in position on top of the water pan. This flange also serves to hold the metal screen of ¼″ mesh which forms the bottom or floor of the medium pan. The screen should be of galvanised wire of a gauge not less than 10 s.w.g., since it must be sufficiently sturdy to carry the burden of the medium in which the bulb segments are inserted. The screen is cut to size and laid on top of the flange formed by the angle iron inner frame to which it is then welded.

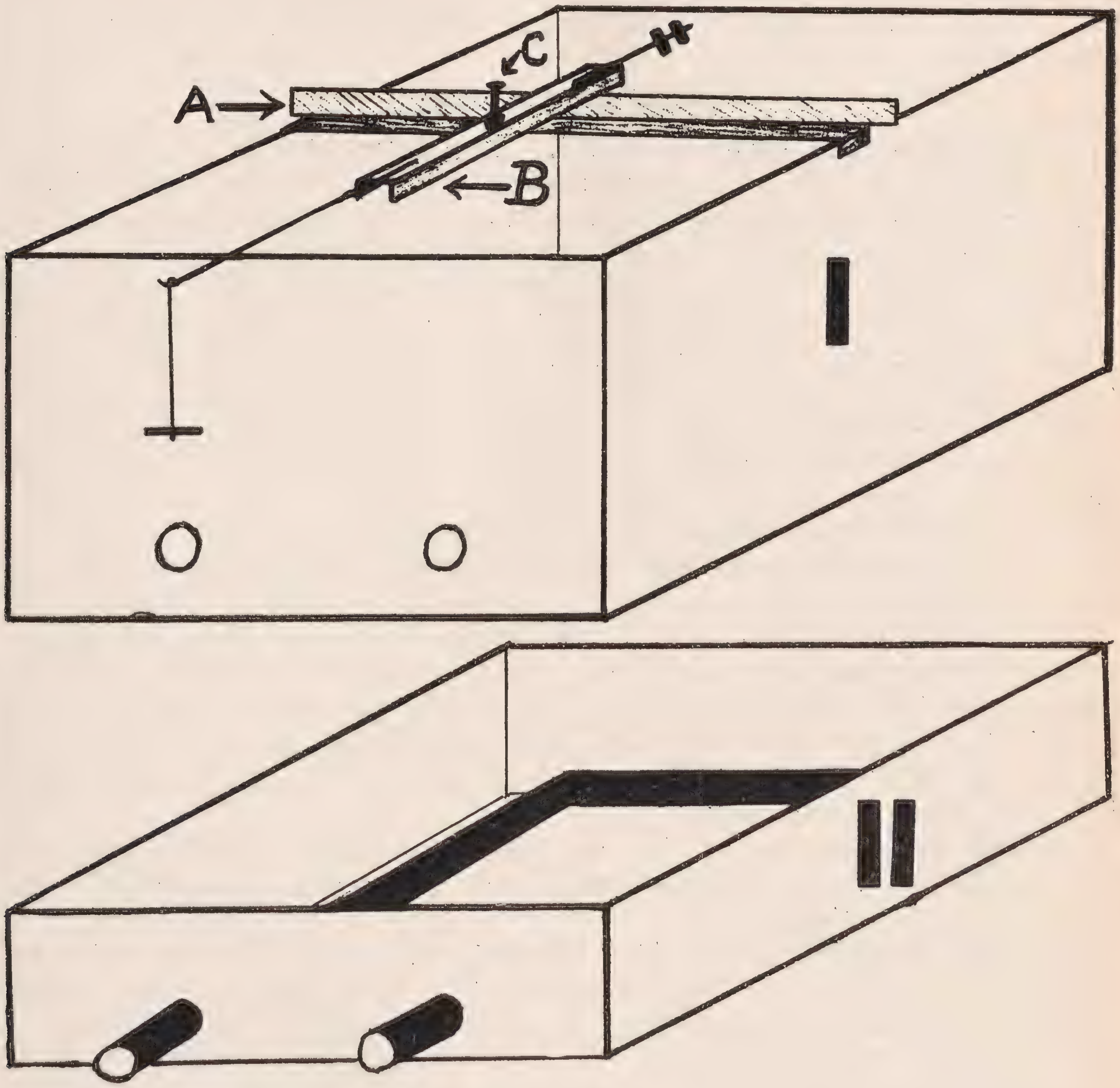

Fig. 35. Incubator unit: Box (I), and Water Pan (II). See text descriptions.

In one corner of the screen a hole is made for a ½″ pipe. This pipe, 9″ long, passes through the hole to a length of 1″ at its bottom end, where it is welded into the corner of the angle iron frame. At the top end, where it is level with the top of the pan, it is held firmly in its vertical position by a welded metal corner brace. This piece of piping which is not shown in any of the diagrams, is most essential because it is through this that the dip stick passes to determine the water level, and through which water is also poured with a funnel to maintain the proper level.

### OTHER ACCESSORIES

*THERMOSTAT—Fig. 36 (IV).* The thermostat is also a homemade contraption. It is placed at the bottom of the medium pan, about in the centre at the same level as the bases of the bulb segments.

It comprises a gas-filled thin metal wafer or diaphragm encased in a metal container to which is fitted a length of copper tube. The wafers that I use, I see, are made in the U. S. A. and are used in fuel heated chicken incubators. It contracts and expands according to changes in temperature to which it is extremely sensitive. The metal container, which must be sealed air-tight, is to protect the wafer against moisture and relieve it of any pressure other than that of the push rod which operates the damper lever. For a metal container, I use an ordinary boot polish tin of the correct size to hold the wafer. A hole is made in the centre of the lid of the tin into which a 6½″ length of ¼″ copper tube is soldered, so that at its bottom end only a fraction of an inch protrudes inside the tin above the hollow on top of the wafer on which the one end of the push rod rests. The push rod is a 7½″ length of 12 gge. galvanised wire, sharpened at both ends and it moves freely up and down in the copper tube. It rests in the hollow on top of the wafer and extends about 1″ above the copper tube, where it makes contact with the thermostat control screw.

The metal container, which for months remains embedded in the wet medium, should be given several layers of a corrosion resistant coating to prevent rusting.

*KNIFE-EDGE CROSS ANGLE—Fig. 35 (I-A).* Please refer to Fig. 35 (I) since I could best illustrate it in that diagram. The cross angle is a 3″ wide x 32″ long strip of 24 gge. galvanised sheet bent to a 2″ x 1″ angle. This is snipped in the bend for a distance of 2″ on either end and the 2″ horizontal ends bent downward at right angles. The cross angle, with the 1″ side upward, is then placed about centre on top of the box across its width and the two bent ends clamped tightly over the sides of the box. Although tightly clamped, it can still be moved backward and forward so that the control screw may be brought exactly over the push rod. The two ends of the 1″ vertical side of the angle may be snipped off so that there is just enough left over to rest firmly on the rim of the box.

*DAMPER LEVER—Fig. 35 (I-B).* Here again this is best illustrated in Fig. 35 (I). The damper lever comprises a channel section, two pieces of 6 gge. galvanised wire, a couple of large steel nuts to serve as balance control weights and a thermostat control screw. The channel section is a 2″ wide x 9″ long strip of 24 gge. galvanised sheet bent to a 1″ wide x ½″ deep channel. To the two ends of the channel, on the outside of its 1″ side and along the centre for about 2″ from the ends, are soldered the ends of the two pieces of 6 gge. wire—the one to extend 22″ beyond the channel to hold the damper and the other to extend 15″ to hold the balance control weights. The latter are large steel nuts with pieces of cork inside them, through which suitable holes are made so that the nuts do not slip too loosely over the wire.

The thermostat control screw—Fig. 35 (I-C)—which is very much enlarged in diagram Fig. 36 (V). is a ¼″x2″ galvanised verandah bolt with its nut. A ⅜″ hole is drilled in the centre of the channel section, somewhat off the middle toward the damper end, and the nut is soldered over the hole, so that the bolt when screwed into the nut may pass through the channel section. In the end of the bolt, which may first be filed flat, a shallow hollow is drilled into which the upper sharp end of the push rod fits, so that it does not easily slip off the control screw.

*LAMP STAND—Fig. 36 (V-A).* This is a simple little table of no particular design which can be knocked up with any odd pieces of scrap planking.

*LAMP—Fig. 36 (V-B).* This is just a regular kerosene burning chicken incubator lamp, fitted with the usual chimney with a mica covered peep hole to watch the flame.

*TEE PIECE HEATER FLUE—Fig. 36 (V-C).* This T piece, which like the water pan flue is made of 22 gge. galvanised sheet, takes the heat from the lamp through the water pan. Its cross piece, which is a tiny fraction smaller than the water pan flue, fits into the ¼″ protruding end of the water pan flue. Its bottom end fits over the lamp chimney, whilst the top end is opened and closed by the damper. In order to conserve heat, I do not leave the T piece exposed, but have encased it entirely in a covering of asbestos cement to within 1″ off the end of the cross piece where it fits into the water pan flue.

*DAMPER—Fig. 36 (V-D).* This is a 3½″ diameter metal disc suspended by a piece of thin wire through its centre, from the end of the damper lever. This damper I also give a top covering of asbestos cement. After fixing the one end of the wire through the centre of the damper disc, the other end should not be cut until the entire unit has been erected and the damper lever sensitively balanced on the knife-edge cross angle. The damper is now brought in position to close the heater flue at the top and the suspension wire bent at the end, at the correct distance from the damper, into a hook which rests on the end portion of the damper lever. The wire can now be cut beyond the hook.

When balancing the damper lever, see that the damper is correctly over the heater flue and the thermostat control screw is immediately over the push rod. Two tiny sharp notches are then made in the edges of the channel section where they rest on the knife-edge of the cross angle. This will help to keep the damper lever in the correct position and prevent shifting. The damper lever is sensitively balanced by shifting the

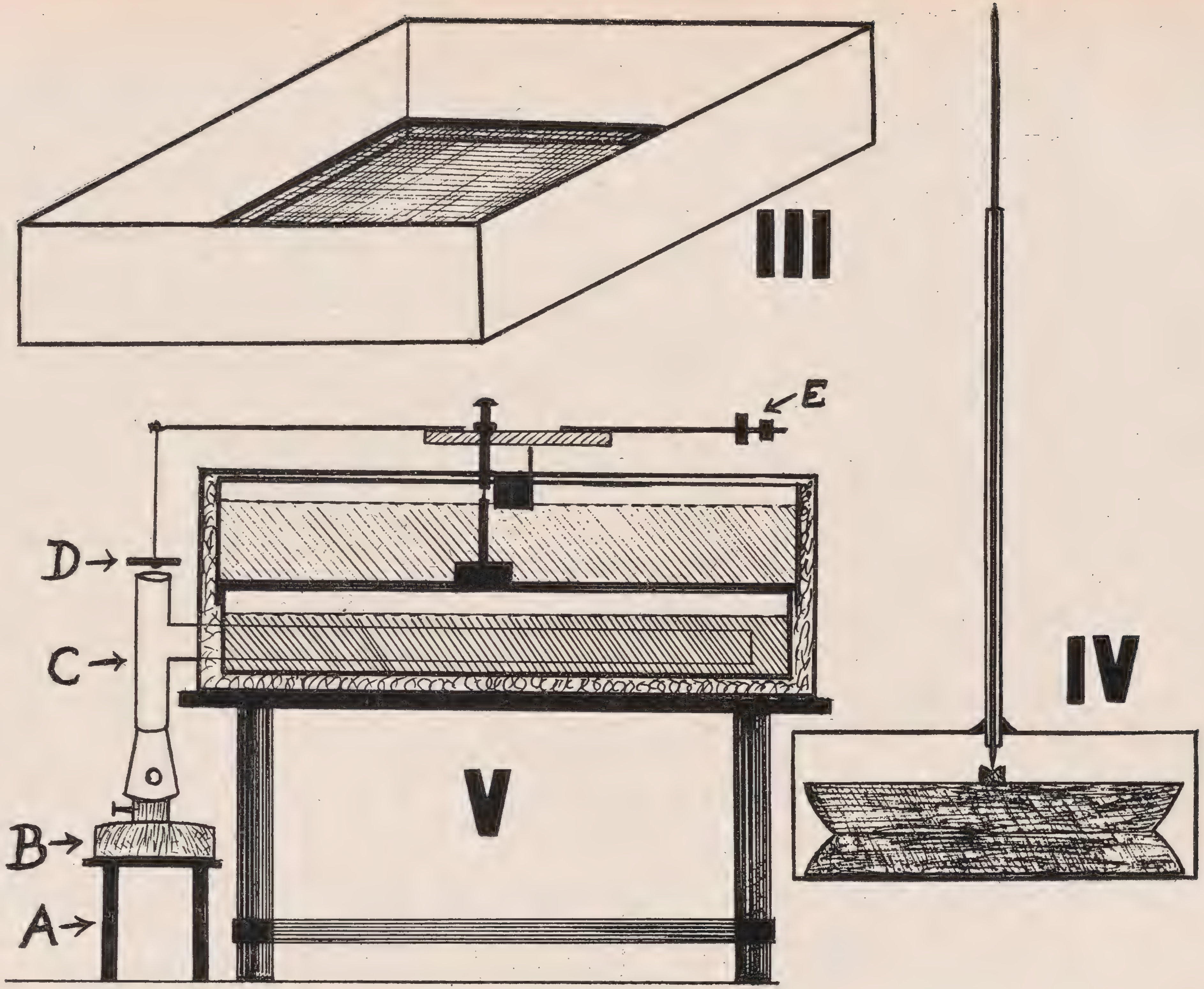

Fig. 36 Incubator unit: Medium Plan (III), thermostat (IV), and comcplete assembly (V). See text descriptions.

control weights—Fig. 36 (V-E)—until they almost lift the damper from the heater flue. There will then be practically no pressure on the thermostat wafer and the slightest expansion will cause the push rod to lift the damper lever and thus raise the damper off the flue. These adjustments, of course, are not made until the whole unit is in operation.

*THERMOMETER.* Although it is not shown in any of the diagrams, it is of such importance that any attempt to operate the incubator would be completely futile without the thermometer. I have found a dairy thermometer to be the only suitable one. It is sufficiently long and appropriately graded for the mercury to be visible above the medium from 80 degrees F. upward and readings easily taken. Proper heat control is thereby assured.

### THE PROPAGATION MEDIUM

The medium in which the bulb segments are placed should be inert and free of organic matter which might cause the segments to rot. It should also have moisture retentive properties. I successfully use 2 parts cleanly washed coarse river sand, 1 part charcoal screened ⅛″ to ¼″ and 1 part exfoliated vermiculite similarly screened. Both the charcoal and vermiculite must be definitely free of dust. These ingredients should be thoroughly mixed.

### ASSEMBLY AND PREPARATION

The unit is assembled as shown in Fig. 36 (B). The box is placed on its stand. Two lengths of 2″ x 3″ timber are laid on the bottom opposite the holes and the whole of the bottom covered between and around the timber with insulating material such as vermiculite, glass wool or dry sawdust.

The water pan is next placed in position with the ends of the flue fitting through the holes in the box and water poured into the pan to a depth of 4½″.

The medium pan undergoes prior preparation before being placed on the water pan. First a layer of teased coconut fibre, or coir as we know it, is placed on the screen at the bottom of the pan and firmly pushed down by hand to a thickness of about 1″. Make sure that the entire screen bottom is well covered with the coir which is then thoroughly soaked with water. On top of this, place a ½″ layer of well damped medium. Although thoroughly damp, the medium should never be soaking wet. The medium pan is now ready to be placed over the water pan in the box. The bulb segments with the base downward can then be placed on this prepared bed and covered with wet medium. Here again, the medium should not be soaking wet because that will cause rot. The thermometer is also placed on this bed in an upright position close to the thermostat and with its mercury bulb at the level of the base of the segments. The thermometer, naturally, is placed in position only when filling up with medium reaches towards the middle of the pan.

The medium pan is of a size which will accommodate 15 rows of segments, allowing 3″ for each row as it is packed in, starting from the back of the pan and working forward. I actually use galvanised flat sheet partitions of 4″ x 23½″ long which I place between the rows of segments and these remain in place until I remove the bulblets. The partitions are equally spaced and kept in position by resting against tiny lugs spot-welded to the sides of the pan. The rows of segments are thus progressively filled up and covered with medium as they are placed on the prepared bed of the pan. Partitioning also prevents the different varieties of bulblets from mixing when taken out. A covering of medium to ½″ over the tops of the segments is enough.

The cavities between the pans and the walls of the box are now carefully filled, from the bottom upward to the rim, with insulating material such as was placed on the bottom of the box under the water pan.

Next, the control screw is adjusted so as not to touch the push rod, the damper is seen in position on top of the flue, the damper lever is sensitively balanced as already described, the lamp is filled and lit and placed in position under the flue. The height of the lamp stand is such that the top of the lamp chimney can almost touch the bottom end of the heater flue. The lamp is then lifted so that its chimney fits into the flue and a couple of old magazines or a piece of plank inserted under the lamp to keep it in position. This padding can readily be retrieved when the lamp is to be removed for filling, lighting or wick dressing.

Carefully keep an eye on the thermometer and as soon as the temperature rises to 80 degrees F., the control screw is finely adjusted so that the damper will start lifting with any increase in temperature beyond 82 degrees F. and close again with any drop in the heat. The optimum temperature is 82 to 83 degrees F. and temperatures from 85 degrees upward are harmful to the segments, whilst temperatures below 80 degrees retard development. The operator will by practice soon learn how to adjust the control screw and to lower or raise the flame of the lamp with the heat of warm days or the cold of chilly nights.

Except during hot dry spells, it will not be necessary often to wet the medium from the top. Should this, however, become necessary, apply water through a fine rose and do so sparingly to avoid soaking. Normal evaporation from the heated water pan is sufficient to maintain constant moisture in the medium in the region of the segment bases.

After a period of about 4 months, the little bulblets should be sufficiently advanced for removal from the incubator and can then, without detachment from remaining parts of their original segments, be planted in a growing medium such as is normally prepared for young seedlings. For some time, however, until they are properly established, they require a little pampering and should be protected against the heat of a severe sun and also against cold.

So much has already been written in previous Year Books on the preparation of bulbs before cutting—and the manner in which the segments are cut, that I have not thought it necessary to touch upon that aspect in this contribution. As regards the time of year for incubation I must, however, stress that the incubators are put into operation and the bulbs cut at the very height of dormancy and immediately before the advent of the new growing season.

# MY EXPERIENCES WITH HAEMANTHUS KATHERINAE

ARTHUR HOERL

When I obtained my first bulb of *Haemanthus katherinae* it was an extremely rare plant. That was, as I recall it, nearly twenty years ago. Today this hardy plant, stately even without its exotically-beautiful bloom, is still quite rare; yet I can say out of my own experience it is getting around. I would wish that everyone who has a love for plants and flowers had at least one specimen to enjoy. Perhaps such a hope may yet come to pass.

I should say, first, that I am merely an amateur in floriculture, indulging in it for the pleasure it brings, for the beauty which derives to replace many hours that might just be prosaic. Fun there is too. Through it I have found friends at the far corners of the Earth: in Warwickshire in England, in Western Australia, Argentina, the Canal Zone, the Transvaal in South Africa, in India and Israel. It may be I shall never meet them, but by their friendly letters I know them, and through seeds and plants that we exchange we share each a part of our leisure lives. Except for this pleasant bypath I would not now be nurturing a *Fuschia* tree or an Elephantwood tree, raising wilding amaryllids native to the mountain slopes of Brazil and Paraguay, clivias that have been brought to perfection through years of breeding, liliums that have never been seen here. Pots and pans and borders hold exotic plants from many distant, romantic lands.

That is a unique kind of fun.

The common bond between all these far away friends has somehow always been forged by *Haemanthus katherinae.*

That first bulb of mine has flourished into many thousands of fruits, seedlings, flowering plants. *Haemanthus katherinae* (which may be abbreviated as H. k.) is a quite hardy plant and will flower in a pot or in the garden. In my area, the San Fernando Valley in Southern California, the temperature drops on occasion as low as 26 degrees at night. H. k. seems to thrive on it right out in the garden soil. In various experiments I have made in conjunction with a research program now in progress I have held young bulbs in the freezing compartment of the refrigerator for 2, 3, and 4 weeks. Then they were all planted out; almost all the bulbs survived and continued their growth. There were other specimens placed in a closet, shutting light out completely for a month or more in testing growth against photo period. The plants grew normally without light—all growth *stark white* of course. When the specimens were brought into the light they were green within 72 hours and went on to flower. So the plant seems to adapt itself to the environment, within limits.

A most extensive research on H. k. in many biological phases is now in progress and will go on for a lengthy period at the Department of Biological Sciences, Dartmouth College, New Hampshire, under the direction of Professor William T. Jackson. It was my privilege to be able to furnish some hundreds of bulbs to assist in starting this research and I am still sending weekly specimens for dissection. This research has spread now into other fields including, I am advised, the medical. Facilities at such institutions as Brown University, the University of Florida, Texas State Teachers College, and North Carolina State are at work. I learn through correspondence that the University of Oregon is at the outset of its own research on *Haemanthus katherinae.*

It may be anticipated that papers on these research projects may be available in the not-too-distant future.

So, as I remarked, H. k. is getting around.

It may be of interest to other amateur growers to detail my method of propagation. The plant blooms for me starting in late June and through July. (Incidentally one of the avenues of the current research is the developing of the procedure to bring about all-year blooming). In order to bring it to fruit requires hand-pollination. Each bloom has up to a hundred florets in a nearly circular head often from 6 to 8 inches in diameter. Florets are pollinated individually. As high as 50 per cent fruiting can be obtained.

The fruit ripens to a deep red in late October and November. I extract the seed at once and plant in pans. When I have 1000 seeds or more to plant I often use flats, 1000 seeds to a flat. The planting mixture I use is 50/50 vermiculite and milled sphagnum, well moistened, a sterile mix. The seeds are pushed halfway into the mix. The seed is pearly and the green embryo is visible. Germination, usually 100 per cent, is from 10 days to 3 weeks, in the form of a radicle. Usually it seeks the mix; when it doesn't I prod it in gently. The bulb and roots form at the end of the radicle. Within another month the first true leaf comes out, the seed shrivels up and falls away.

I keep the seedlings for a year in the mix. (I have even kept them for 2 and 3 years and they continued to grow). From the mix they are potted individually in 4″ pots, graduating up each year. Blooms usually come the fifth year although I have had plants bloom in four years. Adult plants I have in 10″ pots, and even 12″. Some of the seedlings are also planted directly out in the soil. There may be a question about this procedure where there is extensive freeze and snow, although I have it from a friend who sent some of the plants to Colorado where they were planted out and survived and went on growing and flowering. But perhaps that would be a gamble because the habitat of the H. k. is Natal and Rhodesia where it probably does not get quite that cold.

Out in the garden is where H. k. grow most luxuriantly. I have had leafing past two feet and flower stalks of more than 36″. In Southern California the plants are practically evergreen, the new year's growth bursting out of the center of the leaf stalk while the leaves are still green. (I then cut off the previous growth to let all the strength go to the new growth). If the old growth does die off the new growth comes right up in February and March. H. k. may be considered dormant only in January in my climate. Another avenue of the present research projects is a study being made to induce enforced dormancy.

A few words about light reaction with H. k. may be of interest to those adventurous gardeners who might wish to experiment with this plant. All the specimens I have in pots and pans are kept out-of-doors (in fact, I never bring them into the house except to enjoy a bloom or in making some experiment) in a patio which is covered to permit filtered sunlight. Out in the borders the H. k. are located to be in partial shade, usually to allow them morning sunlight. Some are even in positions where they do not receive sunlight and only reflected light. As a test some specimens are planted in direct sunlight. In all positions they thrive, although those in direct sunlight show a slight fading of leaf color and are not quite as robust as those in semi-shade. In a shady spot the foliage is a charming shade of green, somewhat lighter than, say, *Eucharis and Clivia.* From my experience it would be suggested that the plant thrives best in partial shade or even in full shade with good reflected light. Also in such a situation the flowers will have no inclination to fade, the florets being a deep coral pink with anthers a deeper shade of coral, and pollen yellow. Truly a really beautiful picture.

As for fertilizing: perhaps that might make the plants even more robust. As an actual fact I have never fertilized any of my hundreds of plants aside from that contained in the potting medium. This is merely an idiosyncrasy of mine. I keep my soil always heavily mulched and let the plants struggle for their own existence. It is merely my opinion that roots will go deeper in search of their own food and become sturdier and more disease- and pest-resistant. For example, I never spray my garden at all. If lady bugs and mantis are around let them get fat. This year I had hardly even an aphid. For potting, too, I have a formula, never using any loam soil: mixing shredded redwood bark, oak leaf mold, humus, milled bean straw, a bit of steer manure, vermiculite, and some bone meal.

I said I think it's fun. It really is.

*4321 Vantage Avenue,*
*North Hollywood, California*

# CRINUM CULTURE IN MARYLAND

WILLIAM W. ZORBACH, *Maryland*

For a preliminary report, including directions for the preparation of a satisfactory soil mixture, attention of the reader is invited to Plant Life, *19,* 101-105 (1963).

Of special interest, at this writing, is a continued success in the wintering over of crinums. The original bulbs of *C.* 'Cecil Houdyshel', C. 'Ellen Bosanquet' and C. *powellii album,* planted along the south wall in the fall of 1959, are now handsome clumps and this summer (1964), the longer leaves of 'Cecil Houdyshel' attained a length of 6′. This year, the original lath shade was removed to prepare the area for a small conservatory, and the three subject crinums were exposed to a full and very hot sun. Under these conditions the three specimens appeared to thrive and the writer was rewarded by twelve scapes on C. *powellii album* which were produced over the period June 15 to July 15.

The habit of these three beautiful crinums is distinctly different as handled in this area. Although 'Cecil Houdyshel' produced only 5 scapes this year, the first of these preceded by one week *C. powellii album* while the last finished blooming in late August. The outer covering of the stalks of two offsets of 'Cecil Houdyshel' are splitting at ground level at this writing, and because this phenomenon invariably precedes the appearance of a new scape on the main bulb, it is considered that the two offsets, by now having attained blooming size, are ready to produce scapes for the first time.

*C.* 'Ellen Bosanquet', in spite of the number of offsets and the clump it has produced, yielded only three scapes. This, however, may have been the result of "freak" weather late in March which had some severe consequences in the writer's garden. As noted previously, this *Crinum* is the most tender of the three and is the slowest starter in spring. This year we had a somewhat warmer March and by the 20th of the month, early items were springing up all over the place. *Tulipa praestans* and *Azalea mucronulatum* were beginning to flower, and *C.* 'Cecil Houdyshel' and *C. powellii album* were already 8-10 inches above ground. 'Ellen Bosanquet' was just pushing up and on March 25, when the air temperature reached 72°, everyone agreed that spring was here to stay. That night an arctic air mass pushed through the Washington area, dropping the temperature some 35-40°, and on the following night, the temperature fell to 20°. The cold weather persisted for three more days with the result that the new leaf growth on the crinums was killed back to the ground. This very likely weakened 'Ellen Bosanquet' to a point where its bloom this year was hampered. Needless to say, *T. praestans* and *A. mucronulatum*, which were in full bloom at the time, were a complete disaster. After twelve years now of observing Washington weather, the writer is forced to agree with an oft-repeated cliché: "If you don't like the weather in Washington, wait a minute!"

To add to such difficulties is the singular lack of rain this summer. Although there was adequate precipitation during the spring, little rain has fallen since May 1 and, at this time, we must be 10-12 inches in arrears. The drought conditions this year are worse even than in 1962. It is true that in isolated areas more rain has appeared than in others, yet such sporadic falls have miraculously avoided the writer's yard. Nevertheless, without any special care in watering, the crinums have performed well and, in view of their extensive root systems, they have proved to be very efficient plants.

New plantings were made along the east wall in the spring of 1963, and include *C. powellii album*, *C.* 'Ellen Bosanquet', *C. bulbispermum*, *C. asiaticum* and *Crinnodonna corsii* (syn.- *Amarcrinum howardii*). The soil along this wall was originally of a poor quality, being light clay, but was improved by the addition of a little sphagnum peat and much coarse sand. Although far from being rich, the soil has excellent drainage properties especially since the bed is raised 4″ with respect to the yard. During the summer of 1963, the newly-planted crinums did virtually nothing at all, spending such time in becoming established. Early this summer a single bulb of *C. scabrum* was planted in the bed, and shows the same behavior. At this writing (September) it has made only 12 inches of leaf growth.

In contrast, the plantings made originally in the fall of 1959 apparently became established in dormancy during the winter, and when spring arrived, they began growth without delay, reaching maturity in about two months. It is recommended, therefore, that crinums to be grown as hardy bulbs in this area be secured in the fall and planted deeply before the cold weather arrives. In this manner, they will be ready for spring growth.

*Crinum asiaticum,* which was planted 10″ deep as measured from the base of bulb (deeper than recommended), appeared to suffer the most from its reluctance to establish, primarily due to the character of the bulb. During the summer following planting, there was considerable withering and rotting of the outer layers, and when fall came, the diameter of live bulb was sharply reduced. The decision to winter over this species was a calculated risk, and after a hard frost killed back the little leaf growth which had been made, the bulb was covered lightly with wood ashes and leaves. Miraculously enough, this *Crinum* survived in this location and has been making slow but steady growth during the present summer. Also, the bulb has thickened considerably and it is the writer's prediction that blooms will be obtained later in the fall. All the other crinums planted in this location easily survived the winter, and this summer the newly acquired *C. powellii album* and *Crinnodonna corsii* have bloomed.

Perhaps it would be well at this point to further qualify growing conditions for crinums in the writer's yard. Both the south *and* the east are protected locations in the Washington area. East winds are rare and south winds in winter are quite warm. Cold air, on the other hand, comes either from the northeast or west; therefore, plants grown along the south and east walls are protected from freezing winds. Because the writer's home is of split-level construction having basement-type rooms in the east half of the house, both the south and east wall are heated to a depth of 5′ below soil level by warm air in the rooms. There is little doubt that some heat transfer through the walls to the soil outside is continuously taking place during the cold weather, and evidence for this is taken from the observation that offsets of the main bulbs form more readily in the direction of the wall. The implication to be drawn from this heating effect from the inside is not that this condition is necessary for wintering over crinums but, rather, that it must certainly offer a decided advantage over less auspicious locations. Without this added advantage, *C. asiaticum* most likely would have perished; indeed, this may have been a factor also in the wintering over of hybrid gerberas, which are planted alternately with the crinums. This has proved to be a desirable combination inasmuch as the former serve to provide color continuously during the summer and fall, long after the latter have finished blooming.

In closing, the writer cannot adequately extol the qualities of these fine plants. Of the various amaryllids grown here, the crinums are by far the most outstanding, and to describe them as magnificent is something of an understatement. Because of the warm weather and long growing season in this area, leaf growth is luxuriant and as landscape bulbs, they are peerless. Desirable also is the fact that they appear to be disease-free and not subject to attack by the usual garden pests. With a minimum of care and protection in the winter, they flower faithfully, becoming stronger each year.

Long live the genus *Crinum*!

*September 8, 1964,*
*3602 Dupont Ave.,*
*Kensington, Maryland*

## GROWING WORSLEYA RAYNERI FROM SEEDS

[In 1962 and again in 1964, Mr. Robert D. Goedert, of Jacksonville, Florida, paid a collector to gather seeds of the Blue Amaryllis, *Worsleya rayneri,* from a mountain top in Brasil. These seeds were made available to his customers. It will be most interesting and helpful to record the successes and failures of those who have experimented with these rare seeds. Two reports were included in the 1964 Plant Life, and two additional reports are included in the present issue. It is hoped that others will send in reports of their experiments for publication in later issues without any special request from the editor.—*Editor*]

### 3. SECOND REPORT FROM MR. BURR CLOUETTE (CALIFORNIA)

My own single seedling of *Worsleya rayneri* has tripled in size. It is now quite thrifty; is evergreen, and seems to grow slowly most of the time. The first year it usually had only three leaves at any one time, and a rather weak root system. Of late it has had five leaves most of the time, and a few roots showing when the plant with ball of soil is lefted free from the 4-inch pot. I have watered it regularly, and feed it about every three weeks with fish emulsion. It is growing in a south window where it gets strong light all of the time, and about half of the day's sun.

Of six other seedlings given to me by Dr. Traub to raise, two died, but the other four are now growing well under "Gro Lux" lamps where they receive about 16 hours of light.

All five Blue Amaryllis seedlings are planted in "Black Magic" planter mix.—*P. O. Box 483, Rosamond, Calif. 93560*

### 4. REPORT FROM SAN ANTONIO, TEXAS, by Mrs. Robert E. Herold

Mrs. Paul A. Kane passed on to me in 1964, *Worsleya rayneri* seeds that had been sent to her from Mr. Robert D. Goedert of Florida. I was so pleased to get them. She remarked to me that they seemed to be very dry. I prepared a 3# ham can as my flat with a layer of charcoal from the barbecue pit, then a layer of sandy, humusy soil (begonia mix) to within an inch of the top. In the meantime, I made a weak starter solution (Ferti-lome liquid root stimulator) in warm water and treated my seeds as I do sweet peas. I let them soak for about two hours. As I poured this water off the seeds—it moistened the flat. I counted the seeds as I planted and set each one on its side. I had 62 seeds in all. When all were set, I finely covered them with Michigan peat and then covered the can loosely with a strip of Saran Wrap. This was placed on the middle shelf of a Canada Dry display stand which make ideal pot stands on the north side of the garage. They were planted Aug. 31 and on Sunday, Sept. 13, I discovered 3 seeds up. Since that date, each day has been a revelation of new growth. I removed the Saran Wrap after three weeks. At the present time (Oct. 9, 1964), I have 54 distinct bulbils with tiny foliage almost 2″ tall.

# ANDROSTEPHIUM CAERULEUM—BLUE WESTERN STAR

T. M. Howard, *Texas*

A member of the Allieae tribe in the Amaryllis family, *Androstephium caeruleum* is a very small genus that is most nearly related to *Brodiaea* and *Bessera* within the family, and like these cousins, it grows from a corm. This little corm has a loosely reticulated skin from which arise the 4-6 narrow grey-green leaves and the stout little 5″ scape topped by 2-6 fragrant upright facing bells of surprisingly hyacinth-like form and size. The fragrance reminds one of a freshly opened box of candy, and is very pleasing. The color of this little jewel is apt to be almost any shade of blue, of a frosty translucent quality, ranging from nearly white with just a hint of blue, to amethyst, French blue, and deeper violet tones, verging on purple. Indeed, *Androstephium caeruleum* provides those rich ''true blue'' shades that are so hard to come by in bulb collections. A colony of them flowering along roadsides in the wild is a joy to behold and a delight to jaded eyes, often bored by the commonplace fare repetitiously offered to dulled appetites year after year by commercial sources. Discovering these little ''Blue Western Stars'' for the first time is like sharing a secret that few others are privileged to know.

How strange it is that one of our most attractive native amaryllids is so nearly completely unknown among bulb growing hobbiests in this day and time. But the fact is that one may search for *Androstephium caeruleum* in books and commercial lists devoted to unusual bulbs, and it is seldom mentioned, and even more rarely offered. It may as well be non-existent! One can only wonder how or why it has apparently escaped the attentions of the commercial bulb specialists, as it has so many fine qualities that would appeal to gardeners, and it is no more difficult to grow than many popular bulbs. Perhaps it has been passed by because it has never been blessed with a fitting popular name. ''Wild Hyacinth'' is certainly descriptive enough, but other bulbs belonging to *Scilla, Camassia,* and *Muscari* genera also go by this loose term. It has also been called "Funnel Lily", "Blue Star-of-Bethlehem", and "Blue Bethlehem", but none of these names seem to stick. The name, "Blue Western Star" has been suggested, and is adopted here.

Casually one might want to lump it with the *Brodiaea* clan, since its habits are rather similar, but close inspection of the indivdual flowers of *Androstephium* reveal that they have a character of their own that sets them apart. Imagine, if you will, the floret of a Dutch Hyacinth (*Hyacinthus orientalis*) to which has been added a tiny Daffodil-like crown in its center, which is however a stamenial-cup as in *Hymenocallis,* and you have a fair idea of the appearance of *Androstephium.* This little crown is formed by the union of the protruding filaments and this gives it its Greek name, *Androstephium.*

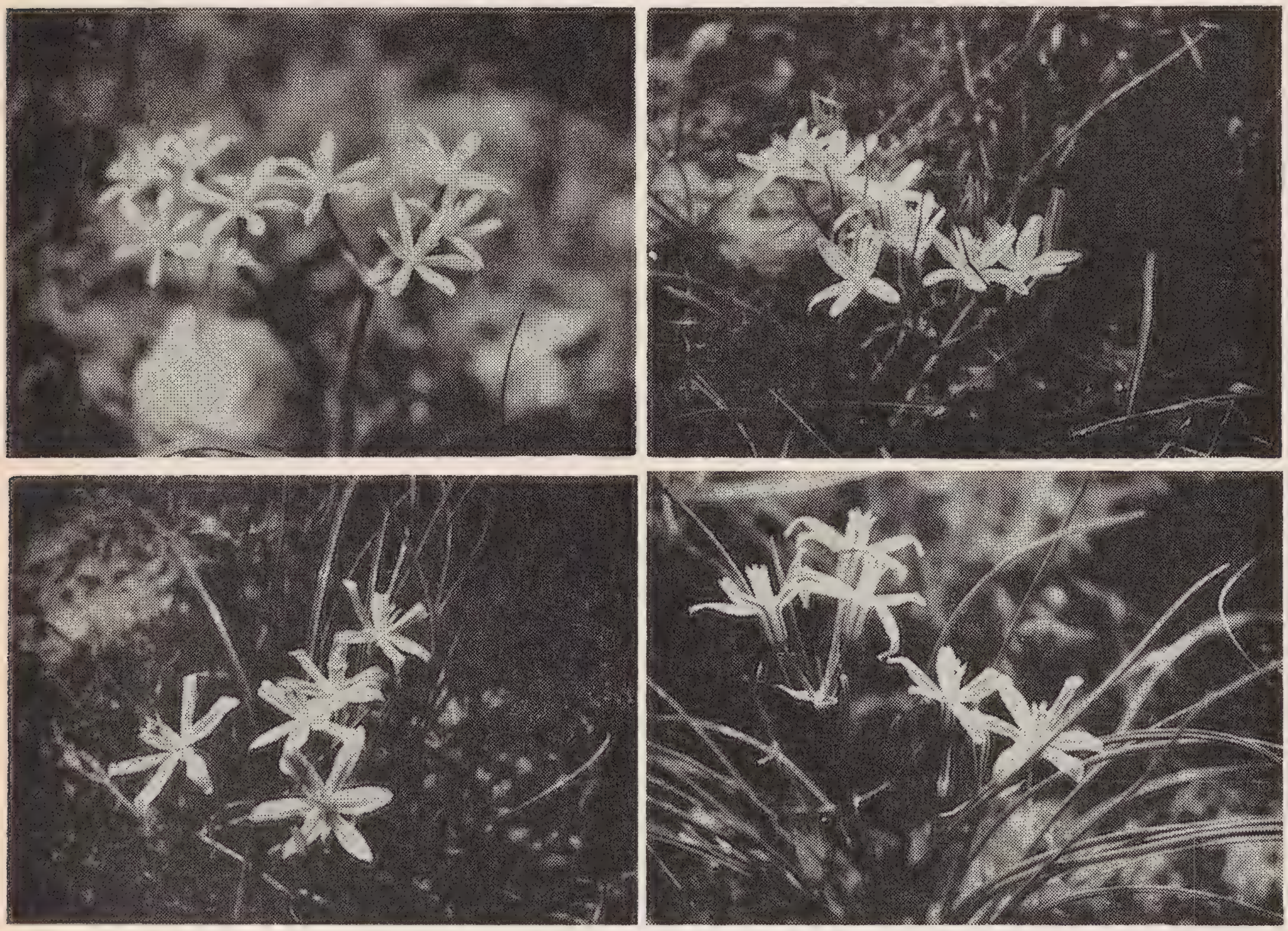

Fig. 37. *Androstephium caeruleum,* Blue Western Star, flowering in its native habitat in southwestern Texas. Photos by Dr. T. M. Howard.

*Androstephium caeruleum* is a native of blackland prairies, said to be found from Kansas (and the Dakotas?) southward to Oklahoma and central Texas. It was collected by the botanist with the Mexican Boundary Commission in the 1850's. Up to the present, I have collected it only as far south as the Northern part of Bexar County, Texas. Thus it is a rather widespread little plant, but is never really common anywhere, and few people know it. In Texas it flowers fairly early in March and April, after which it quickly becomes dormant and disappears for another year. A truly hardy plant, owing to its northerly range limits and its ability to withstand droughts, it should prove adaptable to many climates. Under cultivation it seems best satisfied in a sunny well drained alkaline soil, where it will not be watered while dormant, and it is for this reason that it is best suited for the wild garden. If in doubt, it should be dug when it begins to become dormant and stored in a dry place until fall, when it can be replanted.

Another species, *Androstephium breviflorum* Wats., is is said to be a similar, but more Western counterpart, and is said to range Westward from Colorado into Utah, Arizona, and south-eastern California. I have never seen this species and do not know what differences, if any, exist, but surely it too must be as charming as its prairie cousin.

## SEVENTH GRADE SCIENCE PROJECT

Mr. Hayward called the Editor's attention to the project carried out by Mr. Frank A. Turner, and he was asked to give an informal report on his work. The following letter was received:—

507 Bon Aire Avenue,
Temple Terrace, Florida,
April 23, 1964

Dr. Hamilton P. Traub
5804 Camino de la Costa
La Jolla, California

Dear Dr. Traub:

As a seventh grade Science Fair project at the new Greco Junior High School in Temple Terrace, I chose Propagation of Plants—Without Seeds.

After referring to our Taylor's Encyclopedia, I wrote to Mr. Wyndham Hayward who sent me a copy of the Amaryllis Year Book with a good article on bulb splitting.

On October 29, 1963 I split one bulb of my Mom's dark red *Amaryllis* into four equal parts, being very careful that each part had a portion of the yellow stem. These were then planted in a mixture of sawdust and soil and kept well watered outdoors.

By the middle of February these four parts of the one bulb had each formed a tiny new green bulb from the stem and the old leaf was still crisp and green.

I had split a second bulb to show how this is done and it had been kept in a clear plastic wrap. This bulb by now had not started new bulbs but was blood red.

These were all displayed at our Science Fair on February 25, 1964, with about 700 entries, and I won the blue ribbon for first place in botany, for which there were 50 entries, with seventh, eighth and ninth grades competing together.

I am proud of the blue ribbon and this was interesting fun so I think I would like to find out now what else is true of *Amaryllis* bulbs.

Thank you for asking me to write you about my project. Mr. Hayward's help was encouraging.

Sincerely yours,
FRANK A. TURNER
Age—thirteen years

# POPPED SEEDS, A DISEASE IN HEMEROCALLIS

HAMILTON P. TRAUB

Most breeders of hybrid *Hemerocallis* have perhaps noted the condition which is indicated here as ''popped seeds''. This condition is characterized by seeds which have literally ''popped'' as in the case of popped maize (corn): the endosperm is partly turned inside out. In many cases the germ is loosened from the endosperm and is easily separated. Such seeds are usually a total loss.

It is possible that this conditon may be brought on by excessive moisture, but the writer has noted chiefly another kind in which susceptibility to seed popping is inherited. He noted that in such clones as 'Ann Rutledge', a pastel pink, at least part of the seeds, sometimes all of them, are popped no matter what the cultural conditions. It has also been noted that offspring from such clones also exhibit the abnormality to a greater or lesser degree.

Thus, the best method of control in case of the heritable type of ''popped seeds'' is to weed out the clones which exhibit this abnormality.

It will be interesting to hear reports from others who have had trouble with this disease in *Hemerocallis*.

# CONTROLLING MEALYBUGS ON AMARYLLIDS

SAM CALDWELL, *Tennessee*

Mealybugs have been a bane of my existence for many years. They get down between the leaf blades of clivias, amaryllis, nerines, sprekelias and other amaryllids, causing distortion of the foliage and, I have suspected, spread of the amaryllis mosaic virus. I've managed to keep the mealybug population down somewhat by using a mild oil spray, but have never been able to clean them out entirely.

Now, with the relatively new insecticide, dimethoate, I seem to be well on the way toward eradicating this pest. I use the formulation sold commercially as Cygon 2E. A simple spray application is effective, but experimentally I've tried dipping bulbs and submerging entire pots of growing bulbs—soil, foliage and all—in deep jars of the spray solution. If there has been any injury it is too little for me to observe,

CONTROLLING MEALYBUGS—continued on page 52.

# PLANT LIFE

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GENERAL EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California

# BOWLING GREEN STATE UNIVERSITY PLANTARIUM

William Easterly

This year our campus is being transformed into an attractive display of trees, shrubs and herbaceous perennials. We owe this achievement to the interest of our new president, Dr. William Travers Jerome. He recognizes the need of our University to provide an atmosphere of beauty as well as an atmosphere of scholarly activity. The plantings will be cared for by a full time horticulturist, Mr. Colen Wyatt. At the present time the campus can be divided into three distinct areas as far as the plantings are concerned; (1) general landscaping of the academic area and living quarters for the students, (2) landscaping of the athletic facility which includes a golf course, tennis courts and baseball field, and (3) an area devoted to seedling plants of a great variety of trees, shrubs and herbaceous perennials. The latter area is of special interest to our botany program and will eventually serve as a point of interest to the general public using our golf course.

Laminated plastic labels have been used to name the specimens. The letters are white on a red background. After a few years when the specimens have all been labelled, we plan to prepare a booklet describing our plantarium to campus visitors and friends.

It would be premature to compile a list of our plantings but we have favored maples, oaks, tulip tree, ginkgo, and moraine locust on the inner campus. The athletic facility includes a mixture of spruce, pine, fir, beech, linden, willow, oak, crabapple, viburnum, ash, honey locust, euonymus and a variety of flowering shrubs, and herbaceous perennials. Of special interest in the third area might be *Alnus incana, Amelanchier canadensis,* many species of *Cornus, Chionanthus virginicus, Callicarpa dichotoma, Aralia spinosa, Acer ginnala, Hippophae rhammoides, Larix decidua, Pinus aristata, Photinia villosa, Phellodendron amurense, Ptelea trifoliata, Rhamnus frangula, Rhodotypos tetrapetala, Rhus aromatica, Rhus trilobata,* several species of *Sorbus, Taxodium distichum,* and various species of *Paeonia, Hemerocallis, Lycoris, Ungernia, Narcissus, Sternbergia, Galanthus, Leucojum, Allium,* and other hardy bulbous, fibrous—or tuberous-rooted hardy herbaceous perennials.

## NOTE TO AMARYLLID COLLECTORS

The following amaryllids are growing in my greenhouse in Bowling Green, Ohio. My goal is to obtain seeds from as many as possible. The seeds will then be sown and the plants raised to maturity. I would like to exchange bulbs or seeds with other collectors. My address is William Easterly, 506 Harvest Lane, Bowling Green, Ohio 43402.

The listing is as follows: *Amaryllis* species, LM63-1, from Peru; Iquitos, Peru; *Amaryllis moreliana,* from Brasil; *Zephyranthes* sp. (received as "*Cooperia* inolii"), grown in Texas; *Zephyranthes jonesii*

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D. Don (syn.—*Cooperia pedunculata* Herb.), grown in Texas; *Zephyranthes brazosensis* (syn.—*Cooperia drummondii* Herb.), grown in Texas; *Eucharis grandiflora; Habranthus robustus* (two lots, one from Brasil, the other received as ''Zephyranthes robusta'' from India); *Habranthus texanus; Hymenocallis speciosa,* received from Peru; *Rhodophiala bifida; Zephyranthes clintiae,* rose #154; and *Zephyranthes longifolia.*

# TWO NEW BOMAREA SPECIES FROM PERU

César Vargas C., *Universidad Nacional de Cuzco, Perú*

My studies of the flora of Peru have led me to believe that certain species of the genus *Bomarea,* (Alstroemeriaceae), have not been previously described. I therefore undertake their descriptions as follows:

## **Bomarea tacnaensae** (Fig. 38)

Erecta usque ad 60 cm. alta, caulis robustus apice recurvato, glabro, laeviter angulatus, altrovirens. *Folio*:—Linear-lanceolata, sessilia, 3.5-4 cm. longa, 6 mm. lata, atroviridis, subtus laeviter pilosa et ad caulem adpressa. *Inflorescentia*:—Umbela simplex, 7-11 radiata, bracteae lanceolatae, persistentes, 30-32 mm longae, 6-7 mm latae, albae, subtus pilosulae; radia 34-36 mm longa, bracteolae lanceolatae, 22-23 mm longae, 3-4 mm latae, subtus pauce pilosae, nutantes. *Perianthium*:—Segmenta 30-31 mm longa, suaequalia. Sepala linearia, acuta, atrorubra, viride punctata, subtus alba, laeviter rosea, 7 mm lata. Petala spathulata, in apicem 12 mm, in basim 3 mm lata, flava et viridia, purpureo punctata. *Androceum*:—Stamina perianthi paulum longiora, antherae 3 mm longae, 2 mm latae. *Gynaeceum*:—Ovarium inferioris, purpureum, campanulatum, glabrum. Stylus staminibus brevior, tenuis, stigma styli non crassius.

This new species is an erect herb, up to 60 cm. high, the stem stout, strongly recurved at the apex, glabrous, slightly angular, especially at the recurved part, dark green. *Leaves,* linear lanceolate, sessile, 3.5-4 cm. long, 6 mm. wide, appressed to the stem, dark green, slightly pilose beneath. *Inflorescence,* umbel rays simple, 7-11, the bracts lanceolate, persistent, 30-32 mm long, 6-7 mm wide, minute, white pilose beneath. The rays of the inflorescence 34-36 mm long and the bractlets lanceolate noding at the base, 22-23 mm long, 3-4 mm wide, also slightly pilose beneath. Perianth segments 30-31 mm long, subequal. The sepals linear acute at apex, dark red with green tips, white and slightly pink beneath, 7 mm wide. The petals, spatulate, light yellow and green with dark purple tips, 3 mm wide at the base and almost 12 mm wide at the apex. *Androecium,* the stamen slightly larger than the perianth segments, 3 mm long and 2 mm wide, the anthers *Gynoecium,* Ovary inferior, dark purple, campanulate, glabrous. Style slender and shorter than the stamens; stigma as wide as the style. This species is close to *Bomarea praeustua,* but differs in its simple umbel rays, size and color of the perianth.

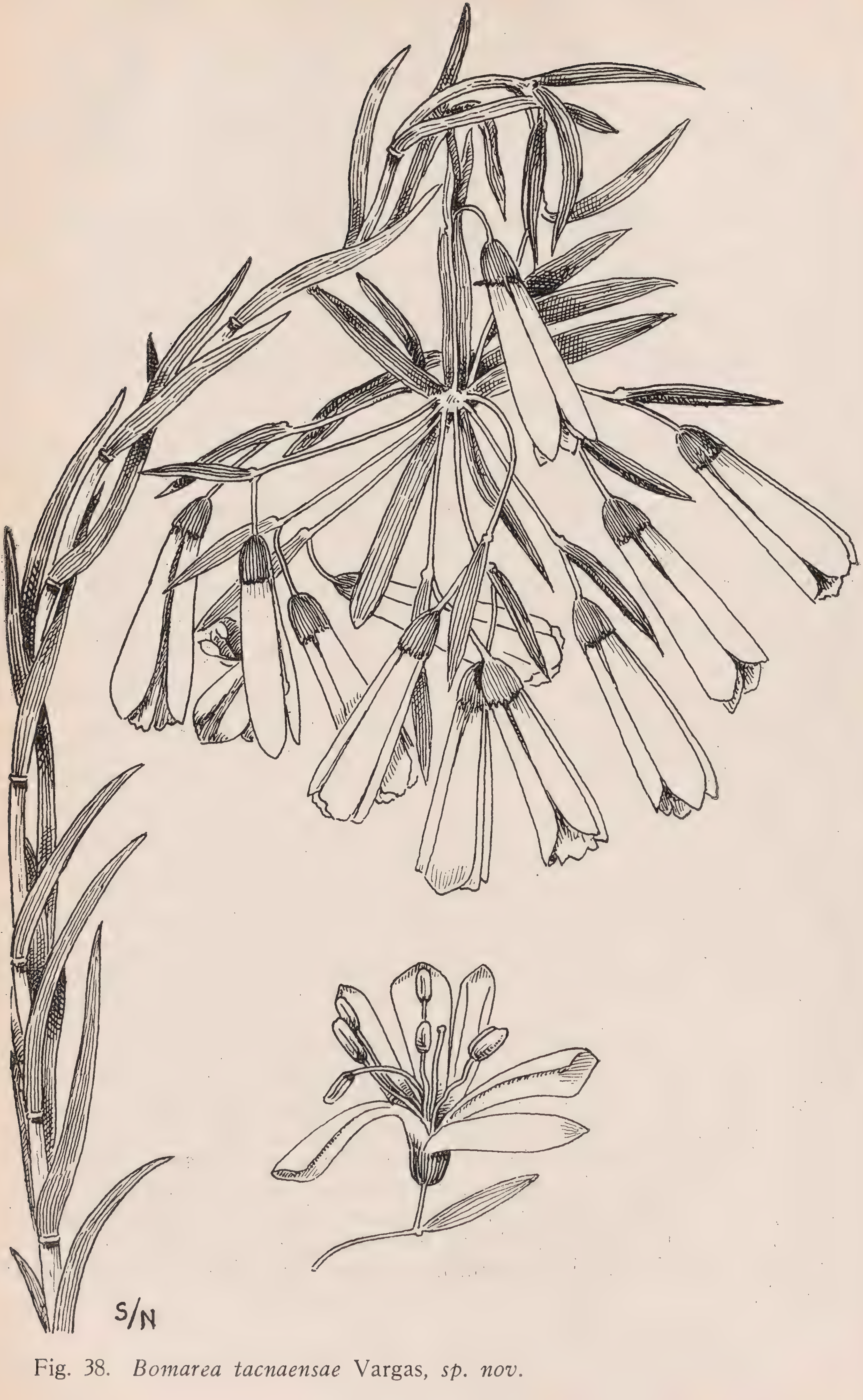

Fig. 38. *Bomarea tacnaensae* Vargas, *sp. nov.*

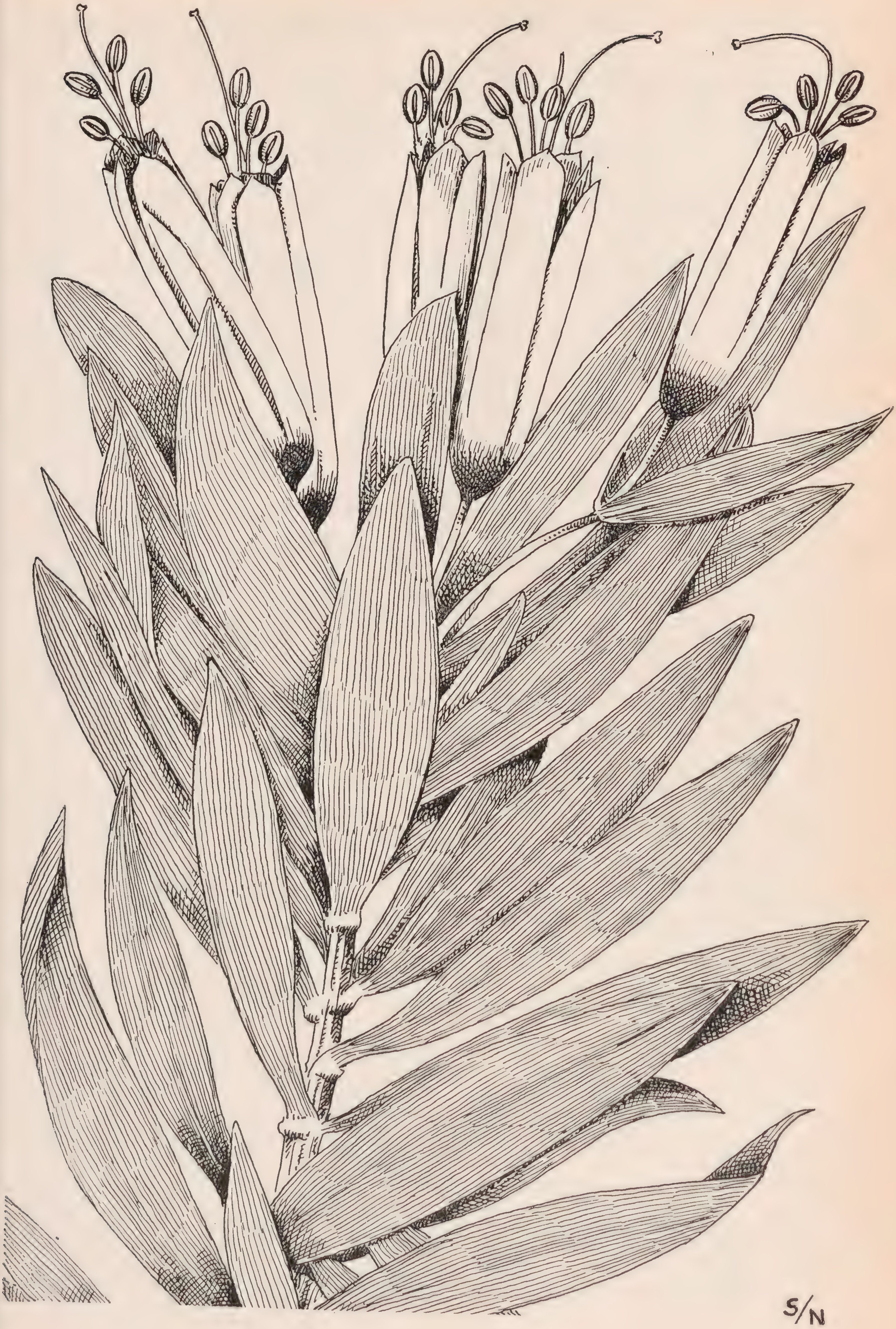

Fig. 39. *Bomarea longistyla* Vargas, *sp. nov.*

*Type locality*: Collected in Department of Tacna, Provincia, Tarata, between the pass of Livini and Tarta, at 3800 m alti. Habitat: on shrubby and rocky slopes. Type specimen: CVC., 13025, Nov. 1959; deposited at CUZ.

### **Bomarea longistyla** (Fig. 39)

Suberecta, 70-80 cm. alta, caulis robustus dense pilosus, flavus et fuscus basi praecipue, apice albidus. *Folia*:—Plurima secunda, membranacea, glabra, subtus laeviter pilosa, ex parte centrali 6-8 cm. longa, 18-20 mm. lata. *Inflorescentia*:—Umbela 5-6 radiata, simplex, bracteae foliorum superiorum non longiora, radia 4-4.5 cm. longa, subangulata, pilis brevibus et glandulis obsita. *Perianthium*:—Florum bracteae longitudine et latitudine foliorum bene evolutis, aequalia. Flores 5-5.2 cm. longi, sepala atropurpurea ad apicem viridia 12 cm lata, petalis paululum breviora. *Androceum*:—Stamina 15 mm longa, exserta, antherae 5 mm longae et 2 mm latae. *Gynaeceum*:—Ovarium semiinferioris, atropurpureum, glabrum, campanulatum. Stylus 22 mm longus exsertus; stigma foliaceum.

This new species is a suberect herb, 70-80 cm. high, the stem stout, terete thick, pilosule, yellow and brown, especially at the base, and whitish near the apex. *Leaves* numerous and secund, membranaceous, glabrous, except beneath, which is slightly piliferous. The middle ones are 6-8 cm. long and 18-20 mm. wide. *Inflorescence*, umbel with 5-6 flower rays; the bracts of the inflorescence, as large as the upper leaves; the flower rays 4-4.5 cm long, minute pilose, glandular, slightly angular. *Perianth*, the bracts of the flower as long and as wide as the normal leaves; the flowers 5-5.2 cm long; the sepals dark pink 12 mm wide, slightly shorter than the petals. *Androecium*, the stamens are exserted almost 15 mm long; anthers 5 mm long and 2 mm wide. *Gynoecium*, Ovary half inferior, dark purple, glabrous, campanulate; the style long exserted 22 mm; stigma slightly foliaceous.

*Type locality*:—Collected in the Department of Ancash, Provincia Bolognesi, Mangas, Cerro San Cristóbal, between rocks, May 1962, by Dr. Emma Cerrate, #4123, Typus, at CUZ; Isotypus, Lima USM.

*Cuzco, Perú,*
*October 31, 1963.*

# PLANT LIFE LIBRARY

EXTRACHROMOSOMAL INHERITANCE, by Dr. John L. Jinks. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 1964. pp. 177. $4.95. This book is one of the short volumes in Prentice-Hall's Foundation of Modern Genetics Series. Dr. Jinks, the author, is Principal Scientific Officer of the Agricultural Research Council's Unit of Biometrical Genetics at Birmingham. He is well-equipped by experience and training to discuss extrachromosomal inheritance. His work with cytoplasmic inheritance in fungi, particularly with *Aspergillus,* has contributed much to this facet of genetics.

Sigmund R. Suskind and Philip E. Hartman of the McCollum-Pratt Institute, the Johns Hopkins University, are Editors of this series of books. According to the Editors the books are designed to "make possible a stimulating, selective treatment of the various aspects of genetics at the intermediate level". The author has conscientiously adhered to the limitations imposed by the editors; the book is clearly not a college text nor a reference work for graduate students and investigators.

Until about the 1940's there was little interest and not much was known about extrachromosomal inheritance except in higher plants where the classical work of Bauer, Correns, Renner, Rhoades and others, mostly with maternal inheritance of plastids, stood as lonely beacons surrounded by a sea of knowledge concerned with Mendelian chromosomal inheritance.

During the past two decades the picture has changed; investigators working with microorganisms such as yeast, *Neurospora, Aspergillus, Paramecium, Amoeba,* etc. have discovered many new, novel and important examples of extrachromosomal inheritance. At the same time, *Oenothera* workers have made fundamental discoveries in the field of extrachromosomal inheritance. Likewise, the thorough and brilliant work of Michaelis on cytoplasmic inheritance using *Epilobium* as experimental material is just commencing to be appreciated.

Dr. Jinks is concerned first with establishing a physical basis for the continuity of extrachromosomal constituents that might serve as bearers of hereditary determinants. There are two classes of extrachromosomal bodies that could conceivably qualify: (1) fiber-producers such as centrioles and basal granules, and (2) metabolic controllers such as mitochondria and plastids.

In the next few chapters Dr. Jinks has set-up rules for identifying extrachromosomal inheritance. Then follow chapters on the nature of the extrachromosomal system, relations between chromosomal and extrachromososal systems, and lastly the extrachromosomal role in development, variation and evolution.

The book is well written, and with few exceptions is free of the troublesome typographical errors that almost inevitably crop up in any book. The black and white diagrams are neat and informative and there is an excellent index. Surprisingly, the specific name of the Four O'clock, *Mirabilis jalapa* (*M. jalopa* in the book), is consistently misspelled, and unhappily, the black and white photographs from which the Frontispiece was composed did not reproduce well. For those geneticists and cell biologists who feel the need to up-grade their understanding of extrachromosomal inheritance, this stimulating book is highly recommended.—*Thomas W. Whitaker*

ECOLOGICAL GENETICS, by E. B. Ford. John Wiley & Sons, Inc., 605 Third Avenue, New York, N. Y. 10016. 1964. Pp. 335, Ill. $7.75. This book is a product of thirty years of research by a group in the Department of Zoology, Oxford University, under the leadership of Professor E. B. Ford, along with his close colleagues, Professor P. M. Sheppard and Dr. H. B. D. Kettlewell. The work was stimulated and encouraged by Sir Ronald Fisher until his death (the book is dedicated to him). Sir Julian Huxley has likewise maintained an interest in the experiments, contributing his customary critical comments and suggestions. From research spawned under these prestigious auspices one is tempted to anticipate an outstanding intellectual feast. The discerning reader with the patience to cope wtih the rather small print and 304 pages of text will not be disappointed.

Nearly all of the experimental work is concerned with animals, mostly invertebrates. The book actually amounts to a monograph of the ecological genetics of certain Leptodoptera, chiefly the butterflies, *Melitaea aurinia, Maniola justina* and *Papilio dardanus;* and the Scarlet Tiger moth, *Panaxia dominula.* Professor Ford naturally stresses his own research, but he has chosen *Drosophila* as an example of chromosome polymorphism, and snails to illustrate polymorphism and the development of the "supergene" (his term). The heterostyle-homostyle situation in primrose is the only extended discussion of plant material in the book, but this is only logical according to Ford since little is known about the ecological genetics of plants.

The limitations of space forbid a critical examination of the many excellent chapters in this book, but there are two concepts that form a continuous theme throughout the discussion. (1) "Unexpectedly great selective forces are normally operating to maintain or adjust the adaptations of organisms in natural conditions." It was originally thought that selective advantages of up to about 1 percent in wild populations was about normal. The present work on ecological genetics has shown that values of 20 to 30 percent are commonplace. This means that a population can rapidly readjust itself to changed conditions. Ford goes on to say, "the fact that such powerful selection is normally operating reduces to negligible limits the effects of random drift upon the changes in the frequency of widespread genetic qualities".

(2) Ford is skeptical of the importance of mutation in the evolutionary process. He sums up his position as follows. "Similarly, if ever it could have been thought that mutation is important in the control of evolution, it is impossible to think so now; for not only do we observe it to be so rare that it cannot compete with the forces of selection but we know that this must inevitably be so. One of the triumphs of Mendelism is the demonstration that there exists a system which promotes both great heritable variability and great heritable stability; for extremely permanent genes can be recombined in an infinite variety of ways and there are mechanisms, such as inversion and other devices for evolving close linkage, by which new combinations of value to the organism can be preserved." Ford admits that mutation is originally responsible for the diversity of the genetic units, but he goes on to say, "living organisms are the product of evolution *controlled* not by mutation but by powerful selection."

The above remarks are indeed a gross over-simplification of Professor Ford's elegant experimental studies of wild populations and his cogent analysis and interpretation of the results, but they do indicate the general trend of his conclusions.

The chapters on Mimicry, *Popilio dardanus* and the Evolution of Mimicry, and Transient Polymorphism and Industrial Melanism are among the best to be found anywhere. There are sixteen black and white plates of superior quality, a bibliography of slightly over 300 titles and an index—*Thomas W. Whitaker.*

PLANT PATENTS, WITH COMMON NAMES, 1963 SUPPLEMENT, 2208 THROUGH 2336. Published by the Amer. Assoc. of Nurserymen, 835 Southern Bldg., Washington, D. C. 20005. 1963. Pp. 7. $0.50. This is a supplement to the complete listing of plant patents, nos. 1 through 2207. 1931—1962. In the supplement, the subject matter is arranged under three parts: I. Numerical listings; II. alphabetical listings under common names; and III. alphabetical listings of names and addresses of originators or discoverers and assignees.

GENTIANS FOR YOUR GARDEN, by Doretta Klaber. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016. 1964. Pp. 141. Illus. $4.50. Illustrated by the author, this pioneering book describes nearly one hundred gentian species and hybrids in the first part of the book. The second part is devoted to cultural directions for gentian culture, including also the available rare or difficult ones from the Himalayas, Japan, New Zealand, Europe and America. Highlv recommended.

GARDENS OF ITALY, by Frances M. McGuire. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016. 1964. Pp. 223. Illus. $4.95. This is an informal account of visits to some of the finest gardens of Italy, including the pertinent historical background. The subjects discussed include papal gardens, royal gardens, Roman gardens, water gardens, castle gardens, villa gardens, a Venetian garden, an island garden, lakeside gardens, and a botanical garden.

A HANDBOOK OF DRIED ARRANGEMENTS AND DECORATIONS, by Mabel Squires. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016. 1964. Pp. 95. Illus. $3.25. This is an illustrated handbook for the beginner which presents an introduction to the drying of the vegetative parts of plants and the flowers, and their arrangement for decorative purposes. It explores containers, possibilities with decorative wood, treasures from the sea, natural forms, corn, dried materials for ornamental work, and household articles.

THE FLOWER ARRANGEMENT CALENDAR, 1965, by Helen Van Pelt Wilson. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016. 1964. Paper with plastic ring binding. Illus. $1.50. The publisher sponsors an annual flower arrangement calendar contest. In this little book, the 19th edition, some of the outstanding photographs of floral arrangements accepted by the publisher are reproduced in calendar form for 1965. This calendar will interest those engaged in flower arranging.

CHEMOTAXONOMIE DER PFLANZEN. Band 2. Monocotyledonae (German), by R. Hegnauer. Birkhaeuser Verlag, Basel 10, Switzerland. 1963. Pp. 540. Illus. $ sFr. 98. This is a pioneering attempt to bring together the available information on the chemical composition of the monocotyledonous plants, and to correlate this data with relationships among the 48 families which are arranged alphabetically from *Agavaceae* to *Zingiberaceae*. It is not possible in a brief review to go into detail for the various families, and thus the *Amaryllidaceae* as arranged by Traub (1963) will be singled out as an example to show how the chemical data may be applied.

It is to be noted that typical alkaloids are characteristic of subfam. 4. *Amarylloideae,* and these substances are not reported for the other three subfamilies. In subfam. 1. *Alloideae,* the typical compounds are steroidsapogenins. In subfam. 2. *Hemerocalloideae,* only *Hosta* has been superficially investigated, and on that basis sapogenin has been reported. This is in harmony with the conclusions reached by Traub (1953) on morphological grounds that *Hosta* belongs with the *Agavaceae.* Thus only the genus *Hemerocallis* remains in Subfamily 2, *Hemerocalloideae.* Subfam. 3. *Ixiolirioideae* has not been investigated on a chemical basis, excepting for a brief reference to polyphenols in *Gagea lutea.* This is insufficient for any conclusions.

First, it has to be emphasized that chemical composition has to be considered in conjunction with data from other disciplines—embryology, anatomy, morphology, etc.—and thus conclusions from chemical data should be used with caution. However, on the basis of the evidence, it can be stated that there is a relatively great gap between subfamilies 1. *Alloideae* and subfam. 4. *Amarylloideae.* Thus both could have originated from a common ancestral stock, but subfam. 4. has subsequently specialized in the type of alkaloids revealed at the present which are not present in Subfam. 1.

The chemical data reported, however incomplete, in the text are thus valuable to the worker in lineagics (the grouping of lineages; see Traub, 1964), and the book by Dr. Hegnauer should be in the library of every worker in that field.—*Hamilton P. Traub*

## LITERATURE CITED

Traub, Hamilton P. The Tribes and Genera of the Agavaceae. Plant Life 9: 134—137. 1953.

Traub, Hamilton P. The Genera of Amaryllidaceae. 1963.

Traub, Hamilton P. Lineagics. 1964.

SEASIDE PLANTS OF THE WORLD, by Edwin A. Menninger. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Pp. 303. Illus. $9.95. This profusely illustrated encyclopedic guide to the planning, planting and maintaining of salt-resistant gardens, by an outstanding authority, will be welcomed by all who live by the sea. After a general statement about the problems presented to the seaside gardener, chapters are devoted to enemies, soil, windbreaks, planting, eroding hills and reclaiming marsh land, ground covers, vines, grass and lily-like plants, herbs, and sub-shrubs, shrubs, trees and palms, annuals, vegetables, lawns, and field crops. The appendix covers the subjects of salt tonerance in soils, sources of plant materials, and classification of salt-resistant plants to cold and the sea. Highly recommended.

THE PICTURE BOOK OF PERENNIALS, by Arno and Irene Nehrling. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Pp. 286. Illus. $5.95. Two outstanding horticulturists, a husband and wife team, have collaborated on this charming book. It is profusely illustrated, including some color plates. After explaining why perennials are their favorites, the perennials included are briefly described in an alphabetical arrangement. Next the planning and planting of the garden is explained, and finally, a calendar of operations, and lists of perennials for special purposes, are presented. Highly recommended.

THE CAMELLIA TREASURY, by Mrs. Paul Kincaid. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Pp. 224. Illus. $9.95. This profusely illustrated book by an outstanding authority will be welcomed by camellia growers. The subjects covered include camellias in the past, present and projections into the future, their use in the landscape, choosing varieties, planting and care, pest problems, greenhouse culture, Bonasi and other container growing, propagation, exhibiting at shows ,and use in arrangements. Highly recommended.

AN EASY GUIDE TO ARTIFICIAL LIGHT-GARDENING FOR PLEASURE AND PROFIT, by Vernon Johnston and Winifred Carriere. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Pp. 192. Illus. $4.50. Two authorities on the subject have collaborated to produce this book. After briefly describing the pleasure of light-gardening, the subject is developed in two parts: (1) the effect of light and darkness on plant growth; lamps and equipment; construction of the light-garden; designing the light-garden; care, and feeding of plants; propagation; profit from light-gardening; and (2) compatible light-garden plants. Recommended to amateurs interested in light-gardening.

MODERN ABSTRACT FLOWER ARRANGEMENTS, by Emma H. Cyphers. Hearthside Press, 118 E. 28th St., New York. N. Y. 10016. 1964. Pp. 128. Illus. $4.95. The author, who is an authority, explores new possibilities in the field of abstract flower arrangements, explaining how to identify, evaluate and design such arrangements. The illustrations are excellent. Highly recommended to all interested in flower arrangements.

HOME AND GARDEN CALENDAR, 1965. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Paper, plastic ring binding. The publishers sponsor an annual Home and Garden Arrangements Calendar. In this little book, some of the outstanding photographs of such arrangements accepted by the publishers are reproduced in calendar form. It will appeal to those interested in home decoration.

FLOWERS AND FESTIVALS OF THE JEWISH YEAR, by Lillian S. Freehof, and Lottie C. Bandman. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Pp. 192. Illus. $5.95. This book fills the need of those who observe the festivals of the Jewish Year. It provides information on flower arrangements and table decorations for home, hotel, and synagogue or temple. The background of the festival days is detailed. The text is provided with excellent illustrations.

THE AFRICAN VIOLET CALENDAR, INCLUDING GLOXINIAS AND OTHER GESNERIADS, 1965. Hearthside Press, 118 E. 28th St., New York, N. Y. 10016. 1964. Paper, plastic ring binding. The publishers sponsor an annual African Violet arrangement Calendar Contest. In this little book, some of the outstanding photographs of such arrangements accepted by the publishers, are reproduced in calendar form. This calendar will appeal to those interested in African violets and related plants.

ADVANCES IN AGRONOMY, VOL. 16, edited by A. G. Norman. Academic Press, 111 5th Av., New York, N. Y. 10003. 1964. Pp. 414. Illus. This 16th volume of the series, including contributions from 18 outstanding authorities, represents a rich harvest with reviews on field plant physiology; crop response to "available" phosphorus; corn improvement; salinity in relation to irrigation; response of plants to soil compaction; nitrate accumulation in crops and nitrate poisoning in animals; soil oxygen conditions; population variability in relation to plant breeding; and amorphous inorganic materials in soils. Highly recommended.

PLANT LIFE LIBRARY—continued on page [ix].

# THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

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[**AMERICAN AMARYLLIS SOCIETY, continued from page 2.**]

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### BOOKS

1. **AMARYLLIDACEAE: TRIBE AMARYLLEAE,** by Traub & Moldenke (including the genera Amaryllis, Lycoris, Worsleya, Lepidopharynx, Placea, Griffinia, and Ungernia; Manila covers; 194 pages, incl. 18 illustrations. $5.00 postpaid.

This is required reading for every amaryllid enthusiast.

2. **DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893—1948,** by Norton, Stuntz, and Ballard. A total of 2695 Hemerocallis clones are included and also an interesting foreword, and explanatory section about naming daylilies. Manila covers; 100 pages (1—X; 1—90), includes a portrait of George Yeld. $5.00 postpaid.

**3. THE GENERA OF AMARYLLIDACEAE,** by Hamilton P. Traub. Includes a general introduction, a key to the subfamilies, infrafamilies, tribes, subtribes and genera of the Amaryllidaceae, and descriptions of all the genera. Every member of the Society should have this book for constant reference. Manila covers; publ. 1963; 85 pages. $5.00 postpaid.

**4. LINEAGICS,** Hamilton P. Traub, This is the first outline text for the undergraduate student on the grouping of organisms into lineages. The text is divided into four parts: (a) the history of lineagics and lineagics as an integrated science; (b) basic lineagics, principles and procedures; (c) applied lineagics, principles and procedures; and (d) research methods in lineagics. Recommended for the student in biology. Manila covers, 163 pages, incl. 8 illus. $5.00, postpaid.

## PERIODICALS

**(A) HERBERTIA [First series,** 1934 to 1948, incl.], devoted exclusively to the amaryllids (Amaryllidaceae), and the workers concerned in their advancement. A complete set of these volumes is indispensable to all who are interested in the amaryllids. Libraries should note that this may be the last opportunity for complete sets.

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# AMARYLLIS
## YEAR BOOK

## 1966

*Amaryllis leopoldii*

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# PLANT LIFE

## VOLUME 22

[Nos. 1-4. Jan., Apr.. Jul. & Oct.]

## 1966

EDITED BY
Hamilton P. Traub
Harold N. Moldenke

THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California 92038

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APR 8 1966

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The cover design by Prof. Penrith B. Goff is based on *Amaryllis leopoldii,* recently re-discovered by Dr. Martin Cardenas, as flowered in his garden in Cochabamba, Bolivia.

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# ADDENDUM TO TRAUB'S "LINEAGICS"

Published in 1964

Change "Mauterpuis" to "Maupertuis": *Page* 18, lines 12 and 16; *Page* 35, middle of page; *Page* 36, lines 3 and 7 from bottom; *Page* 37, line 10; and *Page* 46, lines 2 and 12.

Page 60, after the second paragraph defining the term, *lineagics,* add:

For those who might have difficulty in pronouncing the term, *lineagics,* and variations thereof, it is suggested that the pronunciation is analagous to that of *genetics*:

| the discipline: | the practitioner: |
|---|---|
| genetics (ge-net′-ics) | geneticist (ge-net′-i-cist) |
| lineagics (lin-e-ag′-ics) | lineagicist (lin-e-ag′-i-cist) |

PLANT LIFE LIBRARY—continued from page 128.

NORTH AMERICAN SPECIES OF CREPIDOTUS, by L. R. Hesler and A. H. Smith. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1965. Pp. 168 + duplicate set of figures. Illus. $12.50. The purpose of this attractive text is to provide an adequate means for identifying the species of *Crepidotus,* a group of fungi which performs an important role in nature, that of reducing dead tops of trees back to humus. The text is presented on the basis of morphological and anatomical characters. Highly recommended.

MONOGRAPH ON THE GENUS GALERINA EARLE, by A. H. Smith and R. Singer. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1964. Pp. 357 + 20 plates. Illus. $23.50. This outstanding monograph on the genus *Galerina* places this group in its proper perspective in regard to other genera of the gill fungi; and elucidates evolutionary tendencies in the group. This information should be helpful in correlating future discoveries among these fungi. No less than 199 species of *Galerina* are described. Highly recommended.

A GARDENER'S BOOK OF PLANT NAMES, by A. W. Smith. Harper & Row, 49 E. 33rd St., New York, 16, N. Y. 1963. Pp. 428. $5.95. Sub-titled "A Handbook of the Meaning and Origins of Plant Names", this book is a worth while addition to the gardener's library. In the introductory section, the author briefly discusses the subject of plant classification and nomenclature. This is followed by (1) a list of botanical terms with definitions; (2) alphabetical list of plant names with meanings and origins; in each case the author indicates the root words in Greek and Latin together with the accepted definitions which derive from them, and the preferred English pronunciation; and (3) common name—scientific name index. Highly recommended.

CHEMOTAXONOMIE DER PFLANZEN, Band 3. Dicotyledonae. 1. Teil (from Acanthaceae to Cyrillaceae). (German), by R. Hegnauer. Birkaeuser Verlag, Basel 10, Switzerland. 1964. Pp. 743. Illus. $ sFr. 123. Volume 2 (Monocotyledonae) of this work was reviewed in the 1965 PLANT LIFE, and Volume 3 of the same work, concerned with Dicotyledones, 79 families from *Acanthaceae* to *Cyrillaceae,* is the subject of the present review. In the introduction, the grouping of the Dicotyledones according to Wettstein, Hutchinson and Takhtaian are considered, and the chemical characters of the Dicotyledones are discussed. The rest of the text is devoted to a detailed consideration of the chemical compounds found in the fanilies from *Acanthaceae* to *Cyrillaceae.* This reference volume belongs in the library of every taxonomist.

TAXONOMIC BIOCHEMISTRY AND SEROLOGY, by Charles A. Leone (editor). Ronald Press, 15 E. 26th St., New York 10 N. Y. 1964. Pp. 728. Illus. $16.50. The forty-seven papers presented at the International Conference of Taxonomic Biochemistry, physiology and Serology in 1962, are included in this volume. The papers are grouped under seven headings: (1) principles of systematics; (2) perspectives in molecular taxonomy; (3) taxonomic biochemistry of plants; (4) taxonomic serology; (5) comparative biochemistry of animals; (6) taxonomic serology of animals, and (7) molecular taxonomy of microorganisms. This stimulating book is required reading for all taxonomists.

A HISTORY OF SCIENCE: HELLENISTIC SCIENCE & CULTURE IN THE LAST THREE CENTURIES B. C., by George Sarton. (Paperback reprint of the 1959 text); John Wiley & Son, 605 3rd Av., New York, N. Y. 10016. 1965. Pp. 554. Illus. $2.65. The publication of this fine paperback edition of Sarton's 1959 text, places this standard work on the history of western science and culture in the last three centuries B. C., within the reach of all biologists. Very highly recommended.

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PLANT LIFE. VOL. 22, NO. 1, January, 1966

# AMARYLLIS
# YEAR BOOK
# 1966

Year Book of
The American Amaryllis Society
32nd Issue

GENERAL AMARYLLID EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY
Box 150, La Jolla, California 92038

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For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

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[THE AMERICAN AMARYLLIS SOCIETY—continued on page 129.]

# PREFACE

In the 1965 issue, the extreme of irregularity in Amaryllis flower form—*Amaryllis cybister*—was featured on the cover. On the 1966 cover, the other extreme, the most regular Amaryllis flower form—*Amaryllis leopoldi*—is displayed; for which the members are greatly indebted to Prof. Penrith Goff, of the Modern Language Department, University of Kentucky, Lexington, Ky.

The 1966 issue is dedicated to Mr. Leon Boshoff-Mostert of Kleinskuur, Balfour, South Africa, who received the 1966 WILLIAM HERBERT MEDAL AWARD for his outstanding contributions in the fields of Amaryllis breeding and culture over the past two decades. Mr. Boshoff-Mostert contributed informative articles on Amaryllis breeding in past, and two reports on vegetative propagation of *Amaryllis* in the 1965 issue. In the present edition, he contributes an interesting autobiography, and Amaryllis reminiscences. For these contributions all of the members are grateful, and congratulate him on the receipt of the HERBERT MEDAL.

The Blossfelds of Brasil contribute brief biographical sketches; and Mr. Blossfeld writes of *Worsleya rayneri* in its native habitat.

In addition to the articles just indicated, Dr. Joseph C. Smith reports on a new dwarf *Amaryllis,* and also a new *Rhodophiala* species, collected by Dr. Rueppel in Argentina; Mr. Buck writes about additional *Amaryllis calyptrata* hybrids; Mrs. Herold on the rediscovery of *Amaryllis vittata;* Mr. Latapie on a new near-white double *Amaryllis;* Mr. Fesmire on breeding *Amaryllis* that bloom the year 'round; Mrs. Tebben on *Amaryllis* in Florida; Mr. Grubbs on *Amaryllis* in the Pacific Northwest; Mr. Schafer on *Amaryllis* in the North; Mr. Sudd on growing *Amaryllis* from seeds under artificial light; Dr. Corliss on germinating *Amaryllis* seeds in water; and Mr. Goedert on the 1964-1965 *Amaryllis* season.

Mr. Hannibal writes about *Crinum* clone 'Cecil Houdyshel'; *Crinum* clone 'Gulf Pride'; and the Santa Catarina Island *Crinum moorei;* Mr. Clouette on the growing of *Worsleya rayneri* from seeds; Mr. Beckwith D. Smith on growing amaryllis in North Florida; Dr. Jackson on cell division in *Haemanthus;* Mrs. Menninger on her *Nerine* breeding project; Mr. Gallagher on Nerines in England; Mr. Hannibal on *Nerine undulata;* Mr. Buck on *Hemerocallis;* Dr. Flory on the chromosomes of *Rauhia peruviana;* and Dr. Wilsenach on chromosomes of South African amaryllids.

Dr. Howard reports on his 1965 Mexican plant exploration trip; Mr. Authement explains the details for arranging Amaryllis exhibitions; Mrs. Pickard writes about judging Amaryllis; and there are reports on the 1965 Amaryllis shows.

There are descriptions of the new large white-flowering *Crinum brasilense;* and the new light primrose yellow *Crinum luteolum.* And there are other contributions as shown by the table of contents.

Contributors to the 1967 issue of the AMARYLLIS YEAR BOOK are requested to send in their articles by August 1, 1966, in order to insure earlier publication of this edition. Unless articles are received on time, publication will again be delayed to June or July or even later as with some issues in the past. Your cooperation toward earlier publication will be greatly appreciated.

*December 15, 1965,*
*5804 Camino de la Costa,*
*La Jolla, California 92037*

*Hamilton P. Traub*
*Harold N. Moldenke*

PLANT LIFE LIBRARY—continued from page (vi).

INTRODUCTION TO PALEOECOLOGY, by R. F. Hecker (English translation from the Russian), edited by M. K. Elias and R. C. Moore. American Elsevier Publ. Co., 52 Vanderbilt Av., New York, N. Y. 10017. 1965. Pp. 166. Illus. $7.50. This enlarged and updated edition of Dr. Hecker's outstanding text on paleoecology will be welcomed by American students and specialists in paleontology and geology. The topics discussed include (1) the history, objectives and methods of paleoecology; (2) field observations; (3) field collecting; (4) preparation of materials; (5) graphic illustrations; (6) photographic documentation of field observations; and (7) paleoecological exhibits. Highly recommended.

THE EVOLUTION OF BIOLOGY, by M. J. Sirks and Conway Zirkle. Ronald Press, 15 E. 26th St., New York 10, N. Y. 1964. Pp. 376. Illus. $6.00. The objective of the twelve chapters of this book is "to survey the developmental phases through which biology has passed" from prehistoric times, to the first civilizations, the Greco-Roman period, the Middle Ages, early and later Modern times and on up to the attempts to break the genetic code in our own day. This fascinating book is highly recommended.

PLANT ANATOMY, 2nd edition, by Katherine Esau. John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016. 1965. Pp. 767. Illus. $14.50. In this timely second edition of a standard text by an outstanding authority, the objective indicated in the first edition, to bring together "in a comprehensive form, the substance of a course in the anatomy of plants" is maintained. However, due to the great expansion of biological research, the revision is needed in recognition of "the change in emphasis and in the direction of interest." The topics discussed include the plant body, the protoplast, the cell wall, meristems and differentiation, apical meristems, vascular cambium, epidermis, parenchyma, collenchyma, sclerenchyma, xylem, phleem, secondary structures, the periderm, the stem, the leaf, the root, the flower, the fruit and the seed. This book belongs in the library of all interested in plants.

THE CYTOPLASM IN HEREDITY, by D. Wilkie. John Wiley & Sons, 605 3rd Av., New York, N. Y. 10016. 1964. Pp. 115. Illus. $3.50. In this book by an outstanding authority, a concise account of the cytoplasmic factors in heredity are discussed. The author evaluates the evidence from biochemistry, cytology and genetics for the functioning of genetic systems outside the chromosomal apparatus, particularly the cellular organelles. This stimulating book belongs in the library of every biologist.

A HISTORY OF SCIENCE; ANCIENT SCIENCE THROUGH THE GOLDEN AGE OF GREECE, by George Sarton. (Paperback reprint of the 1952 text); John Wiley & Sons, 605 3rd Av. New York, N. Y. 10016. 1964. Pp. 646. Illus. $2.65. The appearance of this excellent paperback edition of Sarton's 1952 text, places this standard work on the early history of western science through the 4th century B. C. within reach of all biologists. Very highly recommended.

PLANT LIFE LIBRARY—continued on page 24.

DEDICATED TO
LEONARD HELDENMOED BOSHOFF-MOSTERT

**TRAUB—AMARYLLID NOTES, 1966,** continued from page 62.

*Urceolina urceolata* var. *fulva* (Herb.) Traub, *comb. nov.* Syn.—*Urceolina fulva* Herb., Amaryll. 194. 1837; *Urceolina pendula* var. *fulva* (Herb.) Bak., Amaryll. 109. 1888.

*Raubia megistophyla* (Kraenzl.) Traub, *comb. nov.* Syn.—*Phaedranassa megistophylla* Kraenzl., in Engl. Bot. Jahrb. 54, Beibl. 17: 2—3. 1916; Plant Life 21: 101. 1965; *Rauhia peruviana* Traub, Plant Life 13: 73—75. 1957.

Notes.—Herbert, in Amaryll. 1837, *numbered* the genera which he accepted (see "Introduction" to facsimile 1966 Reprint, Herbert's "Amaryllidaceae", 1837). The generic name, "Callithauma? Herb.", Amaryll. 225. 1837, "not sufficiently known to enable a perfect generic character", was not numbered, and was thus not accepted by him as of that date (Code, Art. 34-1). Under it he listed "Callithauma? viridiflorum Herb." Amaryll. 225. 1837, based on *Pancratium viridiflorum* R. & P., with the notation that "It is barely possible that it may be an *Ismene*, but very improbable." This was later recognized as the type of a validated *Callithauma* Herb. Herbert also listed "Callithauma?/?spathulatum Herb." Amaryll. 225. 1837, with the notation, "It is probably of a separate genus." Of this he had seen only the bulb and leaves (no specimens preserved), and he could make only a guess (incorrect) as to the flowers; thus listing it in anticipation of its future acceptance as a group, and also of a particular circumscription and rank (Code, Art. 34-2). Thus it was not validly published. *Phaedranassa megistophylla Kraenzl.* (1916) was the first description based on the bulb, leaves and flowers of a plant with similar leaves, and this is the validly published epithet of the species.

## EMEND. ET CORRIG.

"Genus *Lepidopharynx* Rusby" and "*L. deflexa* Rusby" in Mem. N. Y. Bot. Gard. 7: 214—216 (*pessime*), Fig. 1 (*pessime*). 1927, are hereby reduced to *Amaryllis* L. 1753, and *A. cybister* (Herb.) T. & U., respectively (see Traub, Gen. Amaryll. 77. 1963).

Rusby's description and figure were based on a distorted conception of *A. cybister*, particularly (a) the shape and disposition of the tepalsegs, and (b) the stamens and style. The former should have been indicated as quite irregular (zygomorphic), and the latter as fascisculate, declinate-ascending.

HERBERT MEDALIST—LEONARD HELDENMOED BOSHOFF-MOSTERT

# LEONARD HELDENMOED BOSHOFF-MOSTERT

## AN AUTOBIOGRAPHY

My interests in life have always been and, to some extent, still are many and varied. In the field of sport, athletics and rugby gave way to golf and, ultimately, this game was ousted by the first sport and recreation which has been entrenched since my childhood—angling. I still take part in all facets of angling and regularly represent my Province in the annual South African Angling Championships. It was, however, in deep sea game-fishing that, in 1962, I was elected to the three-man team to represent South Africa at the International Contest at the Bahamas. As a dog breeder, I can boast of a few South African Champions and my name appears on the South African Kennel Union's schedule of accredited S. A. Championship judges. I am Past President of the Transvaal Anglers Union, Honorary Life Member of the Witwatersrand Kennel Union, of the Iscor Recreation and Social Club of which I was a founder and of the Iris Society of Southern Africa of which I was also a founder and first Secretary. In the cultural sphere, I am the holder of seven medals for elocution and a couple for singing—all awarded in open competition at our National Eistedfodd. As far as civic honours are concerned, these were not earned, but purely fortuitous, when I was awarded the Honorary Citizenship of New Orleans and also the Keys of the Cities of Corpus Christi (Texas) and Sacramento (California).

But of all I have ever realized, including the thrill at the sight of a new break amongst a batch of *Amaryllis* seedlings coming into bloom, the crowning glory of my life was the news that I had been awarded the William Herbert Medal for 1966.

It was under the British flag, during the reign of Edward VII, that I first saw the light of day. The date was December 28, 1909, seven-and-a-half years after the conclusion of the Anglo-Boer war and five months before self-government was granted to the four Provinces at the tip of South Africa, then under British rule. The place of my birth was the farm Manana in the district of Lichtenburg, at the time still a small rural town in the Western region of Transvaal, which is the most Northern of the four Provinces of the Republic of South Africa.

Little could anyone have known that, as a toddler, I played and romped with bare feet on ground which, within two decades, was to become a segment of the world's most fabulous alluvial diamond digging complex. Even less could I have dreamed that, seventeen years later, as a school champion miler, I would run in seven of the many diamond rushes, in one of which, with burning chest and aching limbs, I found myself in the company of international athletes imported to lead a field of just over 27,000 exhausted peg-bearing runners.

I was the third son to be born to a young couple, barely four years previously wedded. My eldest brother, who holds a high executive post

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in Barclays Bank, was named after my paternal grandfather, whilst the middle brother, one of South Africa's leading poultry breeders, was given the name of my maternal grand-father. There being no more grand-fathers to honour, I was named for a stranger held in high esteem by my father, but whom I have never met. He was a Hollander, not even naturalized, who fought against Britain in then the costliest of all her wars, on the side of a hand-full of unprepared and ill-equipped Boers. This man shared a tent with my father during their enforced furlough as prisoners of war in Burmuda. His name was Leonard Heldenmoed and, although I have been called Leon from my babyhood, those are the names that my parents caused to be inscribed on my baptismal certificate. I have often wondered whether, in naming me thus, the deep affection towards a friend was tempered with a father's challenge to his last born, for the names imply ''Heart of a Lion'' and ''Courage of a Hero''. I am proud of the names and their origin, but I regretfully have to admit that I cannot lay claim to either of the qualities they convey!

My father was a school teacher who successfully devoted as much time and energy to his manifold gardening activities, as to his academic profession. Wherever we lived, the Boshoff garden, in which we all had a share, was always an object of family pride and a subject of envy on the part of neighbours. My mother was a woman of high intellect and dynamic personality with a forceful and ambitious character and was known throughout our country. She was an authoress and a writer for several newspapers and journals. As a leader of her sex, she served on executive committees, often as chairwoman or secretary, of various charitable, church, political and other commendable women's organisations. Even at the time of her death in 1954, after a widowhood of ten years, she held office as Honorary President of the Women's Nationalist Party of the Witwatersrand.

Four years before I finished high school, thought had to be given to the provision for University training of three sons, a somewhat futile endeavour on the salary of a primary school teacher. My father, with a view to better financial prospects, decided to retire from teaching and to commute his pension in order to start up a coal business. In this he was encouraged by his wife and three sons, none of whom, no more than he, was aware of his lack of business acumen. The undertaking was a failure.

In my final examinations, my school led the field in the Transvaal with four first class matriculation passes. University for me, however, in spite of my scholastic success and the offer of three minor burseries, was not to be. After leaving school at the age of seventeen, I embarked upon a banking career in 1927 in the footsteps of my two brothers.

In 1932, after not having seen or heard of each other for five years, I met an erstwhile school friend. During our school years we had nothing in common, other than that we were of the same age and in the same form where she was regularly first in the girls' class, whilst I invariably maintained a similar position in the boys' class. She was then reading medicine at the University of the Witwatersrand in Johannesburg, where I worked in the Bank.

Her father, the late A. M. Mostert, was a farmer in the corn belt on a 19,000 acre estate, a few miles from the little town of Balfour which is situated 50 miles South-East of Johannesburg. I was often invited to spend week-ends on the farm and Frieda and I soon found that we had so much in common that we decided to become formally engaged. Among his many financial and industrial interests, such as being on the South African Board of Directors of Barclays Bank, Mr. Mostert was also Vice-Chairman of ISCOR (South African Iron and Steel Corporation), then in the course of erection at Pretoria, the administrative Capital of South Africa.

Frieda Mostert, the fourth of a family of seven children, sacrificed her medical career and we were married in May, 1933. I then resigned from the Bank in spite of rapid advancement and a promising future, to fill a "ground-floor" post at ISCOR as personal assistant to the first General Manager, at the age of twenty-three-and-a-half years. The commercial experience gained in the Bank, combined with the knowledge acquired through my studies to pass my Bankers' examinations, stood me in good stead in the new job. In addition, I was a proficient shorthand-typist, having attended night classes at the Johannesburg Business College for that training, after passing the final Bankers' examination. During my years at ISCOR, where I had the advantage of being one of the "early starters", I held various senior posts, including that of Assistant Secretary.

My wife's father died in 1939 and in his will left us a portion of his estate, measuring about 2,500 acres. Provision was made for the erection of a suitable home for us on our portion which we have named "Kleinskuur", meaning "Small Barn". We were left a modest but secure cash income for life. Provision was also made for all costs involved in the high school and university education, including overseas studies, for our children of whom there are three. Magda was born in 1934, Ida in 1936 and our son Andries in 1940. The girls are both married and we are the proud grand-parents of five girls and four boys.

Mr. Mostert stipulated in his will that we had to occupy the farm left to us "permanently and beneficially" within a specified period, which entailed my abandoning yet another promising career. I gladly and proudly reacted to his wish, legally to assume his name, which was added to my own as a suffix. This I interpreted as a singular compliment coming from one of South Africa's great men. At the end of 1940 I left ISCOR and we settled on the farm.

During the ensuing year and the few years following, all manner of war-time legislation, emergency measures and control regulations came off the government press in regular flow. The Chairman of ISCOR, the late Dr. H. J. van der Byl, was appointed Director-General of Supplies and strict measures of control were instituted over all industries and essential commodities, strategic as well as civilian. At the instance of Dr. van der Byl, the "permanent occupancy" clause of the will was waived and I was temporarily recalled to service in Johannesburg in February, 1942 to assist in the establishment of the Iron and Steel control office, on the understanding that I would be released towards the end of that year. For nine years, apart from an occasional vacation, I was to see my family only during week-ends.

As the months rolled on, I became progressively more involved in the ramifications of the Supplies Organisation and it soon became evident that my commission was developing into anything but a ''temporary expedient'', as was originally envisaged. As regards Kleinskuur, suitable arrangements were made, under the able direction of my wife, for two farmers to work the land on a share basis, whilst she personally took charge of our herd of Aberdeen Angus cattle and the many farming side-lines. In addition to those multiple responsibilities, my wife found time and energy to add to the nucleus of her imported *Iris* collection which, within the following ten years, developed into not only the first, but also the largest commercial undertaking of its kind in the country. At the same time, she built up a substantial collection of *Hemerocallis.*

Meanwhile, I had interested myself actively, whenever time permitted, in my wife's horticultural endeavours. The sight of about a thousand different named varieties of imported *Iris* in bloom was an impelling inspiration. I required little, if any, encouragement to take part, under her guidance, in my wife's annual ''operation pollination''. I made time, even by artificial light in the evenings, to prepare seed-pans and to plant seeds as they matured. It was, indeed, a proud day when my own creative efforts, some years later, unfolded the beauty of their first blooms.

Whilst during week-ends and the odd spell of vacation, I was thus paving my way towards an ultimate partnership in my wife's *Iris* and *Hemerocallis* nursery, I lost my heart to *Amaryllis,* of which my mother-in-law had a small but attractive collection. She gave me some clones which I cherished, nurtured and admired above all flowers. I obstinately closed my ears to the persistent little voice of conscience reproving me for my divided loyalty. There was, however, no rebuke forthcoming from my *Iris* breeding wife and *Amaryllis* tenaciously prevailed over conscience!

Fate played into my hands in 1947 when my wife received an order for her newest and best *Iris* from the late Mr. A. C. Buller of Stellenbosch in the Cape, then generously acknowledged as the *Amaryllis* King of South Africa. His cheque was returned and in lieu of payment for the *Iris,* my wife arranged with Mr. Buller to send her some *Amaryllis,* a substantial parcel of which arrived in August of the following year. This was the first of many consignments, of what Mr. Buller termed the cream of his collection, to come to Kleinskuur.

Reams can be written on the close association that subsequently developed between Mr. Buller and myself, on our reciprocal visits to each other over a distance of almost a thousand miles and on the knowledge I gained through his instruction. His wish was that I should carry on with the breeding of *Amaryllis* where he had decided to retire, after having worked on the Buller strain over a span of fifty years. My own breeding efforts started with my first crosses in 1948.

By the end of 1950, when I was finally released from the Supplies Organisation to join my family, I had held office at one time or other, as Controller of Iron and Steel, Secretary of the Controllers' Executive Committee (the co-ordinating body of the 16 Commodity Controllers), Secretary of the Board of Supply (which formulated policy), Member of the Cabinet Building Advisory Council, Assistant Secretary to the Director-General of Supplies, Assistant Director of Imports and Exports, and Secretary to the American Lend-Lease Mission during its stay in South Africa for final settlement of accounts.

When the news of my retirement became known, I had various offers of attractive and lucrative posts. I succumbed to temptation and accepted one of these offers, being a directorship at a salary of 50% higher than that which applied to the post I relinquished. In the new office, I had infinitely more time and freedom to devote to the development and improvement of my *Amaryllis* collection which grew to such proportions that, by the end of 1954, it demanded my undivided attention. It was then that I finally came to Kleinskuur, permanently to join forces with my wife. Our son who studied agriculture, with a brilliant College record, later became the third member of the Kleinskuur team and has taken charge of the general farming operations, which he manages most adequately and efficiently.

With gratitude and humility I must record that my wife, who knows more about my *Amaryllis* than I do about her *Iris* and *Hemerocallis,* has been my inspiration in all that I have ever achieved. But this notwithstanding, I want to believe that, by my own efforts in some measure, I have done justice to the confidence which Mr. Buller had placed in me and, more important still, to the great honour bestowed upon me by the Board of Directors of the American Plant Life Society.

## THE BLOSSFELDS

### Biographical sketches

On request of Dr. Hamilton P. Traub, I am submitting a short report on our life and work in South America, to the readers of the Amaryllis Year Book.

Born in 1913 in Potsdam, Germany, the writer is descended from a horticultural family; both his grandfathers were growers and his father was an orchid specialist before he started his seed business. He introduced, among others, *Kalanchoe blossfeldiana.* After my horticultural apprenticeship, I entered the Botanical Institute of Berlin-Dahlem as a student of botany. After a few years, I interrupted studies for a planned six-months expedition to South America. Seven months

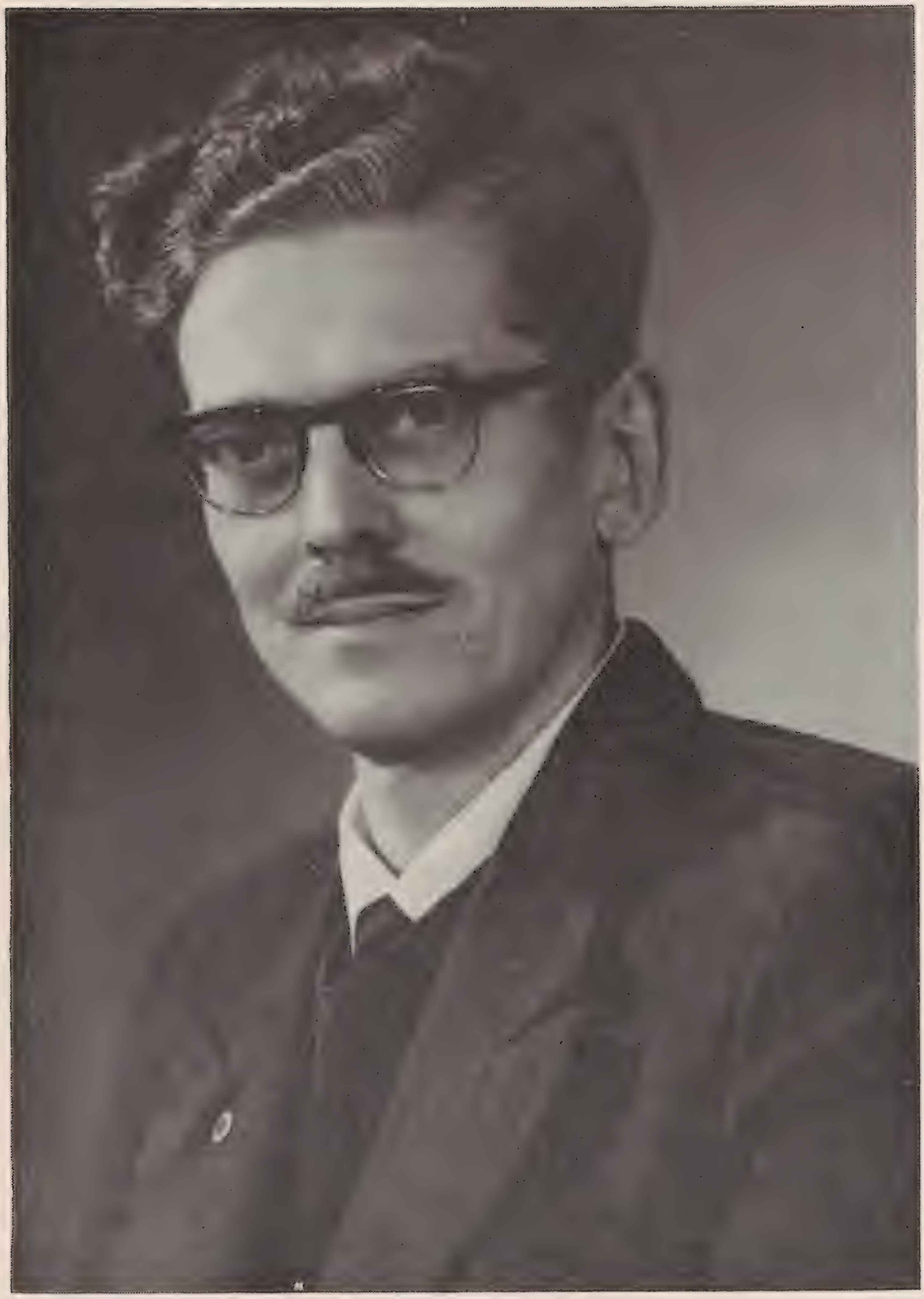

Fig. 2. Harry Blossfeld in 1964

were spent in the Andes Mountains of Argentina, mostly in search of cacti. The plants shipped back proved very valuable—many new species were among them—so that funds were offered from private collectors and commercial growers, for more material. A year was spent in Bolivia, Peru and Chile and a third collecting trip led through Uruguay, Paraguay and Brazil.

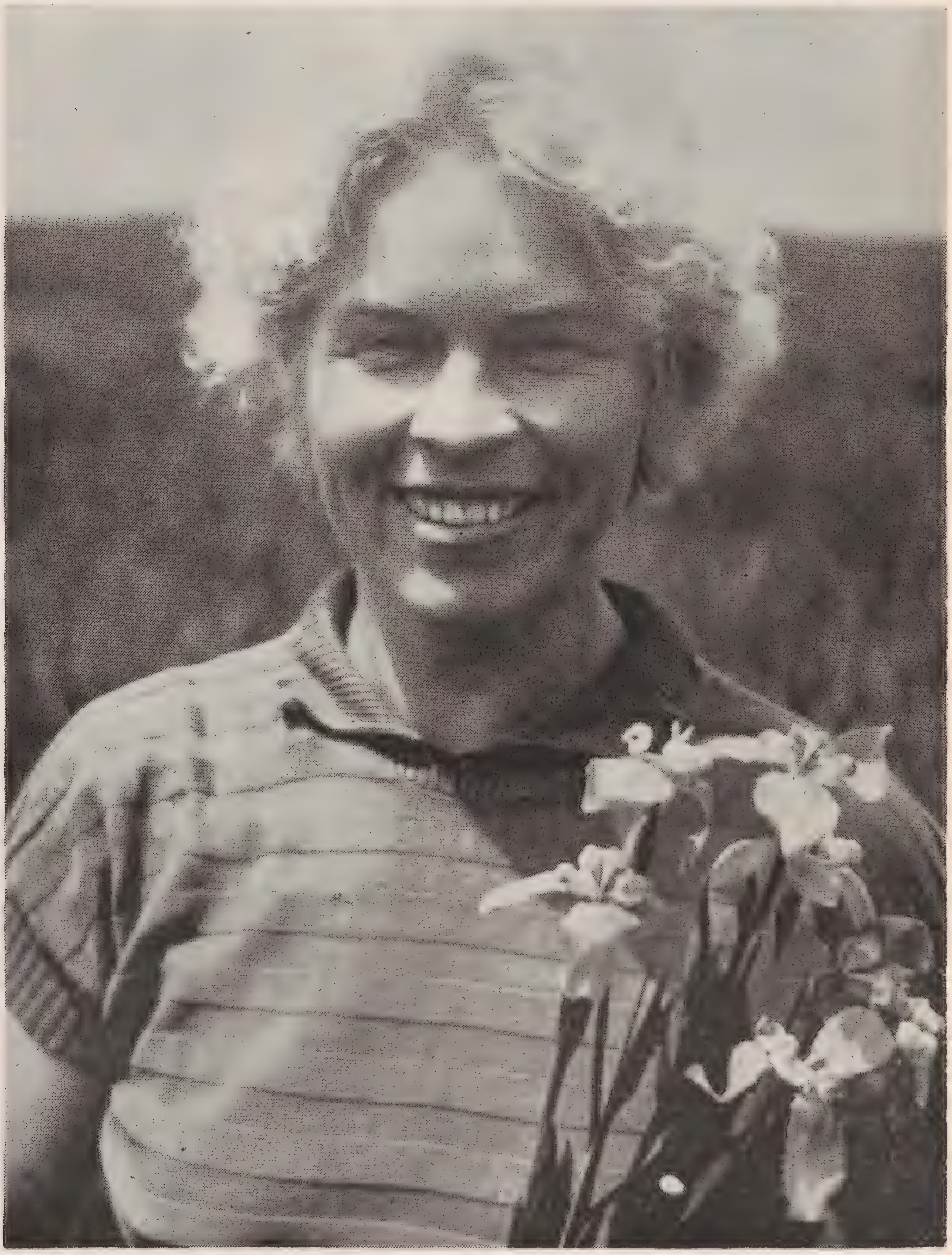

Fig. 3. Mrs. Anita Blossfeld

Engaged in field work near Sao Paulo, Brasil, she holds a bouquet of **Neomarica caerulea.**

Since my return to Germany seemed unadvisable due to the imminence of war, and having contracts for collecting orchids in Brasil, I decided to establish myself as a plantsman in São Paulo, Brasil, where I have lived for the past 27 years.

Here I met my wife, Mrs. Anita Blossfeld. Her family came from the Baltic States. My father-in-law had been a collector of medicinal herbs in the Caucasus, so that my wife got her inclination for botany early in life. We started collecting orchid species and grew them for sale to local amateurs. Most of the money earned was spent in collecting trips; we never had any official subsidy, though we sold and exchanged plants and seeds with many official institutions all over the world. Besides orchids, we always brought home from our travels, many other plants, including Gesneriads, Bromeliads, Begonias and Amaryllids.

After my last trip through Peru, Ecuador and Colombia, I returned seriously ill and have suffered from bad health for about twenty years. Forced to stay home, I started writing for Brasilian agricultural periodicals, and I also wrote a few books on horticulture. My wife began to make trips and made several large and very successful plant collecting trips to Argentina, Peru, Bolivia, Ecuador and Columbia. She developed a special interest in Aroids and brought home a fine assortment of *Philodendron* and *Anthurium* species. For her collecting work, she was awarded the SESQUICENTENNIAL SILVER MEDAL of the Rio de Janeiro Botanical Garden.

With regard to *Amaryllis,* my first field contact was during my work in northern Argentina, where I discovered a wild colony of *Amaryllis immaculata* and shipped a consignment of the bulbs to Holland. This species had disappeared from cultivation. During our collecting trips in Brazil, both my wife and I have gathered a number of species, including *Amaryllis aulica, A. psittacina, A. calyptrata, A. striata* and its varieties, *A. morelinana* and *A. reticulata.* We distributed seeds of these, until a severe freeze and a caterpillar pest (*Xanthopastis timais* Kr.) eliminated our stock. We also localized a colony of *Worsleya rayneri* in the Organ Mountains and have been distributing seeds of this species which is the famous and rare ''Blue Amaryllis''. Some observations on this subject will follow.

*Harry Blossfeld*

*Rua Pedro 360*
*Tremembé da Cantareira,*
*São Paulo, Brasil*

# NOTES ON WORSLEYA

Harry Blossfeld, *Tremembé, São Paulo, Brasil*

*HISTORY*—The famous "Blue Amaryllis" was discovered by the French horticultural collector Joseph Libon, in the Organ Mountains, west of Rio de Janeiro, Brasil, about a hundred years ago. Libon was pretty sure that he had found a new plant and showed it to Glaziou, director of the National Museum, who sent herbarium material to France.

Tradition is, that Glaziou also arranged an audience for Libon, with her majesty, the Empress of Brasil, at which opportunity the collector offered a few freshly gathered flower stems of the "Blue Amaryllis". The plant, from that time on, became known in Brazil by the popular name "Flor da Imperatriz".

A little later, 1863, the new plant also got its first scientific name from the french botanist Duchartre: *Amaryllis gigantea Duch.* Though certainly an appropriate name for an *Amaryllis* five feet high with bulbs up to ten pounds in weight, it proved to be void, because another plant, which we now know as *Brunsvigia Josephine* Ker Gawl. had previously been described by it. The author himself recognized this fact and in the same year, changed the name of the "Blue Amaryllis" to *Amaryllis procera* Duch.

Libon had shipped a consignment of these bulbs to his patrons, the horticultural establishment of De Jonghe, of Brussels, Belgium, who showed the first flowering specimens at a horticultural exhibition, creating quite a sensation at that time. More plants were ordered, but Joseph Libon had perished in the jungles of Minas Gerais, during an orchid collecting trip. The "Blue Amaryllis" had been one of his last discoveries, and certainly not the least. As early collectors generally did, Libon had kept secret the place where he had found the plant and consequently, it disappeared from cultivation for some time.

It was found again by Pedro Maria Binet, a horticulturist established in Brazil. On each of his numerous travels to Europe, he carried a few bulbs of the "Amaryllis Imperatrice du Brésil" with him, selling them at fancy prices in France or Belgium. But always these bulbs flowered but once and then dwindled away, no matter how careful the treatment given to them. They were treated as other *Amaryllis* and forced to compete dormancy in winter in spite of the fact that the species is naturally evergreen. Trials to cross it with other *Amaryllis* species failed, and thus the plant remained a rare curiosity for a long time.

On a botanical excursion through the Organ Mountains, the writer and his wife met with the "Blue Amaryllis" and we gathered bulbs and seeds. Also we have grown about one hundred bulbs in our garden for a few years and thus had the opportunity of observing them. We have visited the natural stands frequently and at various seasons of the year Some facts that seem to have escaped previous students will be exposed here.

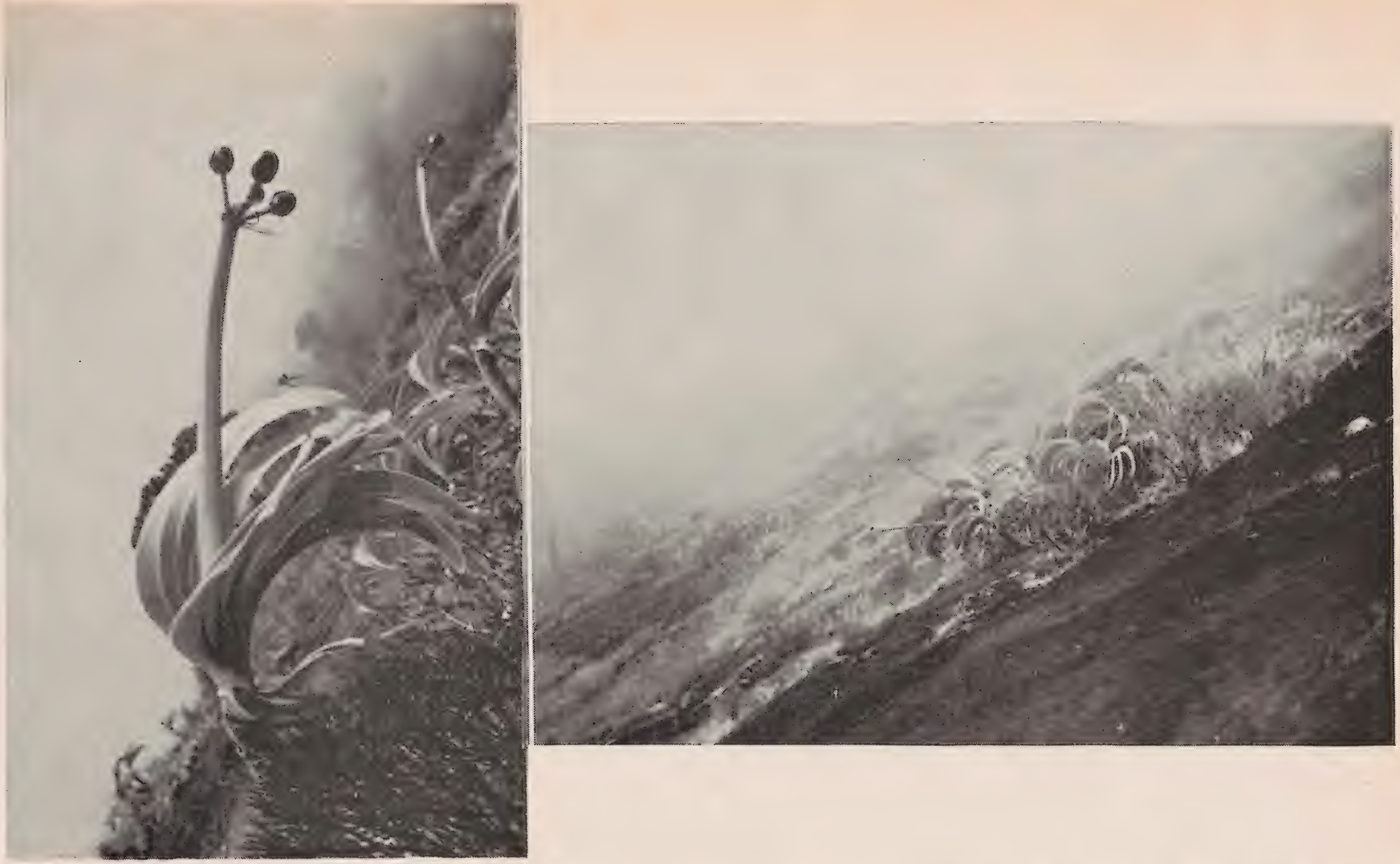

Fig. 4. **Worsleya rayneri** in its native habitat—the Organ Mountains in Brasil. Left, natural stand, with immature seed pods on flattened scapes. In the foreground, a dwarf **Vellozia** shrub. Right, Natural stand as it grows in the Organ Mountains. Note the steepness of the rocky ground and the prevaliing fog during the morning hours when this photo was taken.

*HABITAT CONDITIONS.*—*Worselya rayneri* (Hook.) Traub & Moldenke grows within the tropic belt, but at elevations between 3000 and 4000 feet above sea level. (Fig. 4) The latter fact reduces considerably the theoretical average temperature for the habitat in that latitude. On the other side, it causes the plant to be exposed to accentuated extremes of heat, during exposure to intense sun rays, and of cold, due to heat radiation by night and exposure to cold winds. During some of the coldest nights of our mid-winter (July) temperature may approach the freezing point.

The plants grow on almost bare rocks, that have an inclination of about 30 to the horizon, sometimes up to 60, facing a northern direction, that is in the Southern Hemisphere, fully exposed to the sun. They do not receive shade from other vegetation, which is extremely scant. But they are cooled by an incessant air movement at their lofty place. Where this is lacking, the plants will require some shade.

*Worsleya* grows in patches, sometimes of several dozen specimens in a dense stand, but mostly in narrow rows in a natural crevice of the granite boulders that otherwise have very smooth surfaces. The summits of these enormous rocks are mostly clad with a crown of trees and shrubs that act as condensers of the air humidity. The accumulated vegetable mould of this forest patch therefore oozes out a little water that trickles over the rock surface below, drenching the *Worsleya* roots. During heavy rains, some soil and dead leaves are washed down and accumulate along the rows of the bulbs, thus creating a turfy soil layer, sometimes ten inches thick. On these, seeds of *Worsleya* germinate and form increasing clusters of plants.

On sunny days, the water supply from above stops and the rock surface during the afternoon gets so hot, that one cannot touch it; the air trembles and the rock steams. Even during the night, the accumulated heat radiates from below, so that the *Worsleya* roots stay always moist and warm, even while their leaves may be exposed to temperatures between 40 and 50 F.

Such extreme conditions of heat and cold, scorching sun and water-soaked soil, cannot be endured by many plants. Companions are few and odd; A small terrestial orchid with cinnabar red flowers, *Laelia cinnabarina* Batem. with narrow, succulent bulbs and thick perpendicular leaves, and another rare orchid, *Phragmopedilum vittatum* Rolfe, are noteworthy, A. Vellozia species with triangular stems and narrow leaves arranged in vertical rows, thus shading mutually, is rather common. A giant Bromeliad, *Vriesia imperialis* Carr. withstands the conditions because it has a proper cooling system; it stores five gallons of water between its sheathing leaves, which are covered by a glaucous wax coat above. The *Worsleya* leaves withstand the fierce sun, because they hang vertically and they too have a pruinous wax cover. On limbs of the forest trees on the top of the stone mountains, and epiphythical cactus is found: *Schlumbergera Russelliana* (Lam.) Br. & R. All these mentioned companion plants are considered by botanists as outsiders within their respective families or remnants of primitive evolutionary stages. To such strange plants, *Worsleya* is a worthy companion, a sort of "living fossil" of the Amaryllis family, unique in some respects.

*TAXONOMY.*—as above mentioned, the "Blue Amaryllis" was first named *Amaryllis gigantea Duchartre,* soon changed to *Amaryllis procera Duchartre.* But this name too could not be maintained, because there existed a plant previously named so by Salisbury; this is now known as *Crinum erubescens* Ait. The next following description of the "Blue Amaryllis" appeared in 1771 when J. D. Hooker named it *Amaryllis rayneri* J. D. Hook. In 1943, Traub and Moldenke created a new genus to accommodate this plant, separating it from the genus *Amaryllis.* Hence its name became *Worsleya rayneri* (J. D. Hook) Traub & Moldenke.

The reasons for the establishment of a new genus "*Worsleya*" were as follows:

(a) The existence of four spathe-valves enveloping the flower buds of *Worsleya,* while all *Amaryllis* have only two spathe-valves; (b) Seeds D-shaped, with unequal thickness of inner (straight) and outer (curved) edges; (c) Gestation period relatively long—up to five months, and (d) Leaves sickle-shaped.

And to these should now be added the fact that *Worsleya* has a basic chromosome number of $X=21$ (somatic $2n=42$) as contrasted with a basic number of $X=11$ (somatic numbers $2n=22$, 44, 66) in *Amaryllis* L. (see Flory & Schmidhauser, Plant Life 19: 56057. 1963.)

*DISCUSSION.*—(1) Spathe valves four. This argument is unquestionably valid, it has been interpreted as evidence of a primitive stage of evolution.

(2) "Seeds D-shaped, the inner edge 0.5mm thick, the outer about 1 mm thick, somewhat sunken and wrinkled between the margins and the side walls."—This argument is equally valid, but mav be extended.

Fig. 5 (1) shows a fully ripe pod of *Worsleya rayneri* seen from the side. Fig. 5 (2) and Fig. 5 (3) show the form of the seed. At "C" is visible the reinforced, wrinkled dorsal wall. Fig 5 (3) shows a cut through a normal seed, showing that the embryo occupies practically the whole volume of the seed. This is an important criterion since most other Amaryllid seeds have a small embryo surrounded by a large, sometimes almost hyaline or papery wing. Fig. 5 (5) shows a *Worsleya* pod, seen from above, fully ripe, but still closed. At "D" are the points where it will start splitting. The three locules contain each two dense rows of closely packed, rather thick seeds, forced to shape into the typical D-form because they will not interpenetrate the divisionary line of their sector. Attention is called to the thick, fleshy walls of the pod.

When by imperfect fertilization, only few seeds are developed in a *Worsleya* locule, these sometimes occupy the whole space of the locule and then become perfectly orbicular. Also the uppermost and lowermost seed of each locule have a partial orbicular form, one side convex and the opposite side plane.

For comparison, in Fig. 5 (6) is shown a pod of *Amaryllis aulica* Ker Gawler shortly before ripeness. At "D" are the points where it will split. The seeds of each locule here are equally set in two rows, but they have papery thin wings which overlap mutually. This can happen, because the embryos occupy only the center. In most *Amaryllis* pods, seeds therefore have an oval or oblong shape. Attention is called to the thin walls of the typical *Amaryllis* pod.

(3) ''Gestation period relatively long, up to five months.'' The above observation certainly has been made under conditions of the Northern Temperate Zone, but will not yet come true in the tropics. Normal gestation period of *Worsleya* is about ten weeks. The writer has observed in Brasil, an almost perfect coincidence of flowering and seed ripening between *Worsleya rayneri* and *Amaryllis aulica.* But there is a decided difference between the two genera in the delay normally occurring before the pods empty all the seed they contain. Due to the thick walls of the capsule, as shown in Fig. 5 (5), and owing to a strong reinforcement of the bottom, shown in Fig. 5 (1) at ''A'', *Worsleya* pods open slowly and only to an angle of 30°. This delays dropping out of the seeds. In nature, they are mostly withdrawn by birds. When the *Worsleya* pod cracks, all its seeds are already perfectly ripe and jet black, but it may take two months, before the pod is empty.

As shown in Fig. 5 (6), the foliaceous seeded *Amaryllis* species have pods with thin walls which become quietly and completely dry on ripening. The locules then rapidly fold back to an angle of 90°, exposing the winged seed to the wind. As they are interleaved, each seed detached is likely to unfasten its opposite neighbor, so that the process of emptying a pod is a matter of a few days only.

*Worsleya* seeds are much too heavy for wind dispersal. Their average weight is about 7.5 grams per hundred, so that approximately 400 seeds weigh one ounce. A large part of the seeds simply drop out of the pods by gravity, but the lower parts of the rocks, where they finally might germinate, is clad with dense vegetation, so that *Worsleya* has very little chance of survival there.

A small sort of parrot, that lives in bands, can frequently be observed withdrawing *Worsleya* seeds from the ripe pods. On the least disturbance, the whole band bursts upon wing, each bird carrying a seed in its beak, which is eventually dropped during the flight. This fact explains, how *Worsleya* may grow high up on the cliffs, where they are completely out of reach, clustering at quite inaccessible spots.

(4) ''Bulbs with an extremely long aerial neck.'' This feature is conspicuous in *Worsleya;* some of the largest specimens are five feet high, of which three feet belong to the neck. As to the taxonomic importance, the matter is of subordinate value, because it refers to the vegetative organs of the plant and not to its reproductive parts. It may be mentioned, that *Crinum Moorei* Hook. f. has an equally conspicuous long aerial neck and nobody would think of separating it for that from its genus. However, when taken in connection with the other features, it helps to characterize the genus.

(5) "Leaves sickle-shaped". This again is a fine distinguishing feature of *Worsleya,* unique in the whole family, but for the reasons above mentioned, its taxonomic value is of a collateral order. It may be added, that by the normally inclined position of the aerial neck of *Worsleya* bulbs and by the sickle-shape of their leaves, the blades are kept in a vertical position throughout their length, which is an efficient

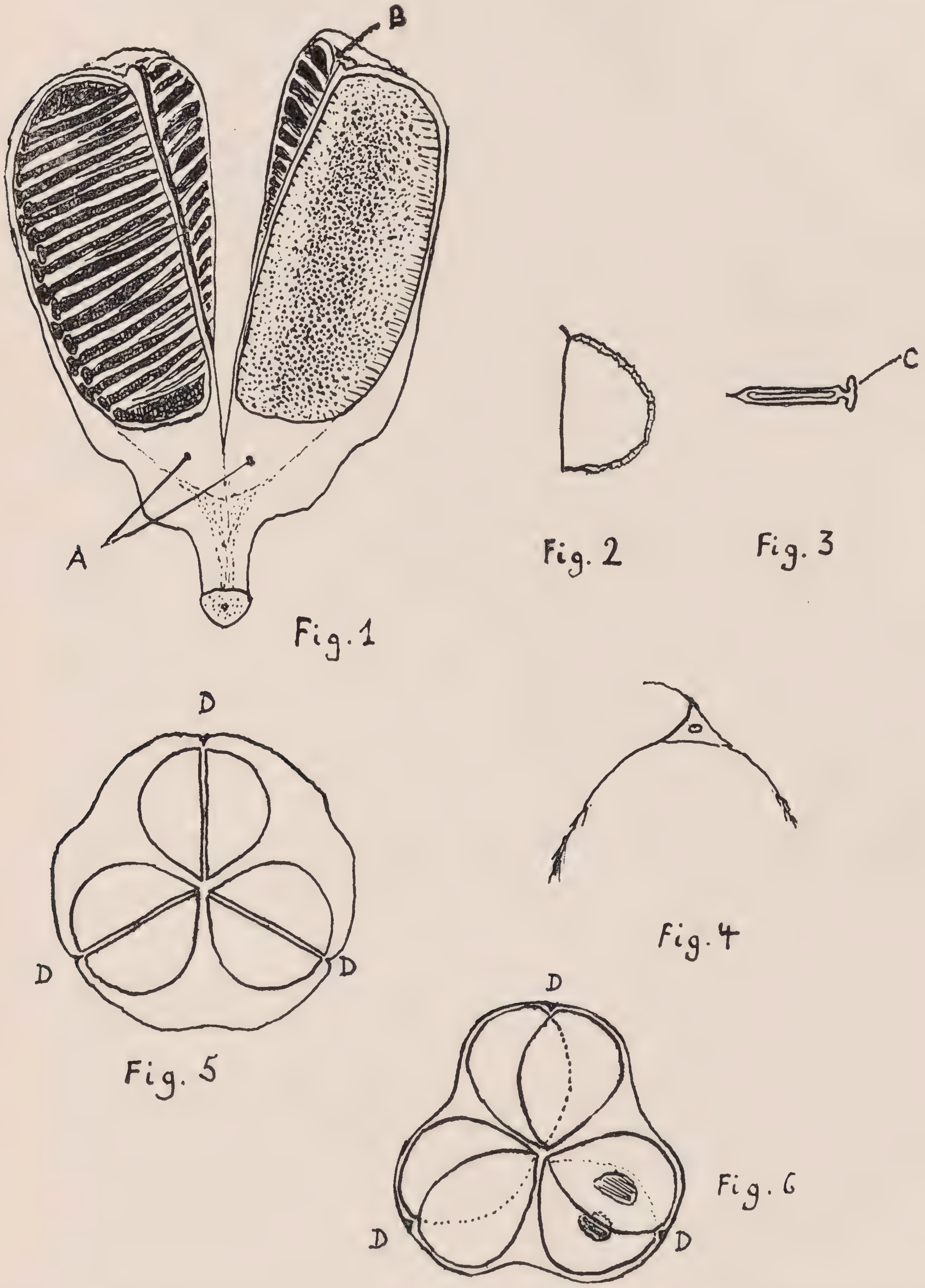

Fig. 5. **Worsleya rayneri** capsule and seeds. See text for explanations.

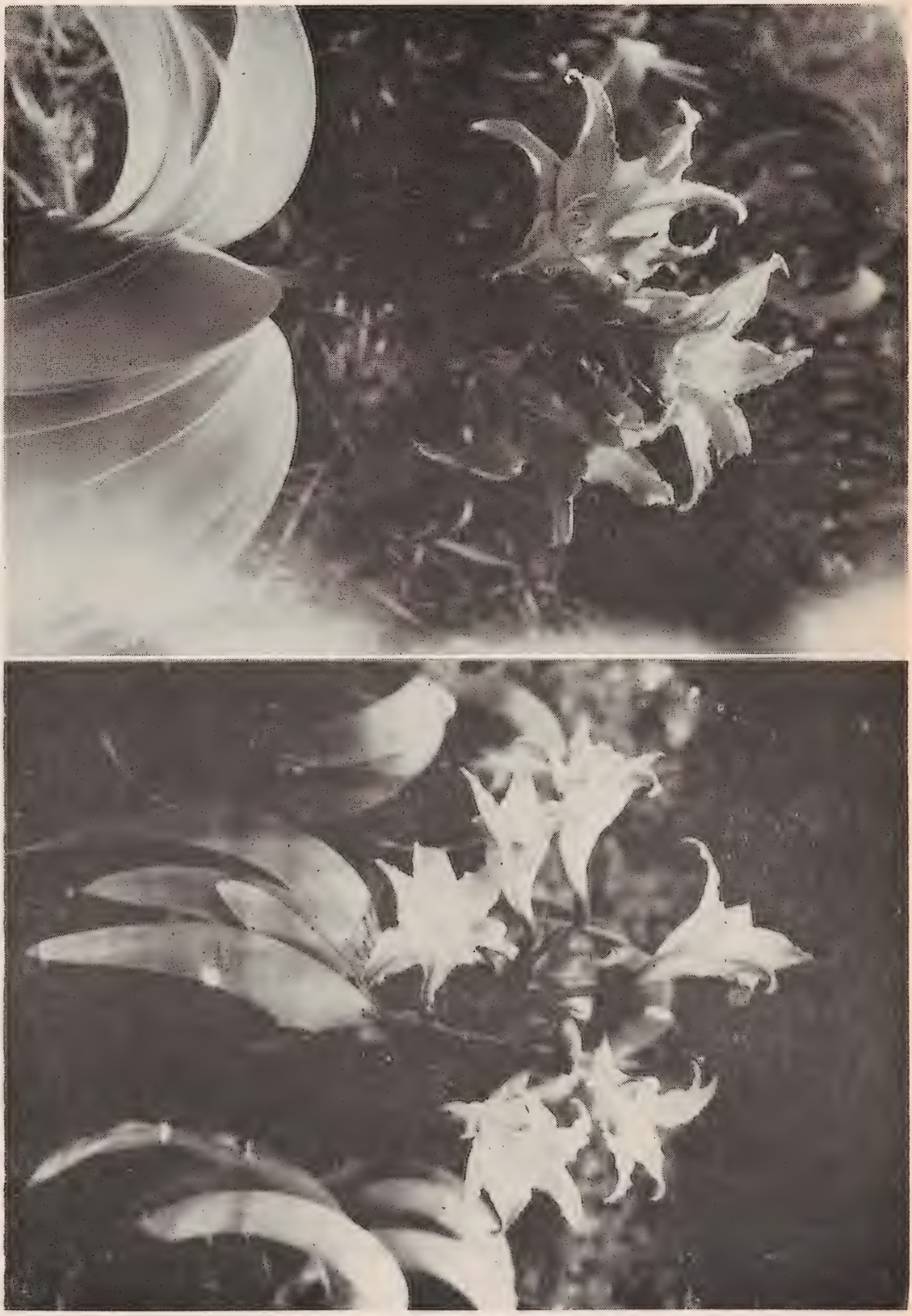

Fig. 6. The Blue Amaryllis, **Worsleya rayneri,** in flower. Left, in the Organ Mountains, Brasil. Right, under cultivation in the Blossfeld garden in Sao Paulo, Brasil.

protection against sun-burn. Furthermore, the blades have a narrow, cartilaginous border of brownish red color. They are distinctly parallel nerved by alternating lines of light and darker green and they are covered by a glaucous wax cover that repels water.

(6) The basic chromosome number X=21 in *Worsleya* sets it off distinctly from *Amaryllis* with a basic number of X=11.

As an uncommon occurrence within the Amaryllis Family should be noted, that the *Worsleya* perigone is dehiscent. While in all of the foliaceous seeded *Amaryllis* species, one can find the dried remains of their perigone attached to the unripe pod during its complete gestation period, the matter is different with *Worsleya.* There, a few days after the flower is wilted, it drops from the still small pod, leaving a big brown scar in form of a three-pointed star at top of it. When the pod becomes ripe and starts to crack, this scar tissue detaches and separates in the form of an extremely thin, papery tissue, from the three points of which hang short, fibrous sutures which had soldered the fruit valves. This triangular tissue is shown in Fig. 5 (4). It has a small, round hole in the center, through which formerly the style was connected to the ovary.

Another significant fact is the longevity of *Worsleya* seeds. Under ordinary storage conditions, this seed will keep its germinating capacity for over one year. This is extraordinary, when compared with the notoriously short lived seeds of the foliaceous seeded *Amaryllis.*

The peduncle that sustains the umbel of flowers in *Worsleya* is flat and sharply two-edged. It is *hollow* in its central part and grows almost straight, while the leaves are curved. Thus, the flowers open well above the foliage, though it is rarely possible to cut these flowers with a stem longer than 12″. The peduncle will continue growing longer while the pods are developing. Strong plants develop two or even three peduncles, but the rule is one flower stem per bulb. The umbels are reported to consist of 4 to 14 flowers, but we did not count more than 8 flowers per stem, the average being 4.

*Worsleya* seems not to be happy when grown in pots. The bulbs have a spreading system of very thick roots that are easily broken. The plants always suffer when transplanted. Grown in large, flat containers, they do somewhat better and best of all, when grown in the open ground.

The plant requires perfect drainage, a porous soil and a very regular supply of moisture. Also they want an abundance of light and as much direct sun as can be allowed without burning the leaves. It seems that the best results were obtained by a grower who used a standarized soil mixture, composed of equal parts, by volume, of fibrous peat and fat, sticky loam.

Under no circumstances, should *Worsleya* be forced to dormancy after blooming. Though slowly, the plant will continue growing new leaves during winter, when temperatures may be rather low. Water should be given scantily but regularly during this season.

# IN MEMORIAM—LEN WOELFLE

T. M. Howard

It is with great sadness that I must inform members of the Society of the passing of Len Woelfle, of Cincinnati, Ohio, who was well known for his work with *Hymenocallis* and other Amaryllids. Mr. Woelfle was born July 18, 1913 and died quite suddenly at his home on August 24, 1964, from a heart attack. His death was a shock to all who knew and loved him. He had been in good health seemingly until his final moments, having just finished mowing the lawn. Mr. Woelfle will long be remembered for his breeding program involving *Hymenocallis*. His hybrids are only now being channeled into the hands of enthusiasts and have been enthusiastically accepted by the few who have flowered them. An effort will be made to propagate his material and place it into commercial channels where it can be enjoyed by all. Mr. Woelfle will be sorely missed. He was a fine person, full of optimism and enthusiasm, and had a genuine love for his fellow man. It is hoped that his efforts to radiate enthusiasm for the plants that he loved will be absorbed by others and that his work will continue. Mr. Woelfle was Chairman of the Pancratieae Section of the APLS and had been active in Round Robins as well.

# EDITOR'S MAIL BAG

Miss Elizabeth Lawrence, 348 Ridgewood Ave., Charlotte, North Carolina 28209, and Mrs. Richard Chase, 4563 Contour Blvd., San Diego, Calif., visited the editor's garden on March 25, 1965.

The members will be saddened to hear that Mrs. A. C. Pickard's husband, Dr. Alpha C. Pickard, aged 68, a renowned physician of Houston, Texas, died of a heart attack, on May 27, 1965. He was a keen gardener, and his wife's co-worker in the breeding and growing of hybrid *Amaryllis*.

Mr. and Mrs. L. S. Hannibal, Fair Oaks, Calif., visited the editor's garden on June 1, 1965.

Mr. Robert D. Goedert, of Jacksonville, Florida, writes under date of July 2, 1965, that he obtained *Amaryllis cybister spectabilis* from Brasil just in time since a dam will flood the area where they grow in Matto Grosso in the next few years.

Mr. V. Roger Fesmire, formerly of Denver, Colorado, has moved to California. His new address is 16938 Edgar St., Torrence, Calif. 90504.

Mr. Kenneth A. MacGowan, of Quincy, Florida, writes under date of June 18, 1965, that "On page 52 of the 1965 Amaryllis Year Book, you quote Mr. C. A. Campbell of Caringbah, New South Wales, as saying that to combat red leaf spot of *Amaryllis,* he had success with a spray made from 'Phenyle'. Then in an editorial note, you hope Mr. Campbell will give more information as to its composition. . . . Mr. Campbell kindly sent me a label from a bottle of 'Phenyle' which proved to be a sheep dip composition used in Australia, with phenol as one of its components.''

The members will be interested to know that in 1964, Louisiana State University conferred the honorary degree of Doctor of Science, D. Sci., on Caroline Dorman, of Saline, Louisiana. This high honor is merited by Dr. Dorman who has contributed materially to art and plant science in the United States.

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PLANT LIFE LIBRARY—continued from page 4.

ULTRASTRUCTURAL PLANT CYTOLOGY; WITH AN INTRODUCTION TO MOLECULAR BIOLOGY, by A. Frey-Wyssling and K. Muehlethaler. American Elsevier Publ. Co., 52 Vanderbilt Av., New York, N. Y. 10017. 1965. Pp. 377. Illus. $24.00. This stimulating text on Ultrastructual cytology by two outstanding authorities will be welcomed by biologists generally. Following the introduction to ultrastructural morphology, the subject is developed under two major headings: (1) under molecular morphology, the principles of molecular structure, macromolecules and virus particles, are discussed; and (2) under cytological morphology, organelles of the plant cell, cytoplasm, nucleus, mitochondria, plastids, cell wall, and ectoplasmic differentiation, are explained. This text belongs in the library of every biologist.

THE HANDLING OF CHROMOSOMES, 4th edition, by C. D. Darlington and L. F. La Cour. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1962. Pp. 263. Illus. $5.00. This is the 4th revised edition of a well-known text on cytological technique by two outstanding authorities. The topics included in the main body of text are: scope of chromosome work, equipment, living chromosomes, bulk fixation, smears and squashes, paraffin methods, staining and mounting, special treatments, control of mitosis and fertilization, photography, autoradiography, and describing results. The appendices are concerned with sources of material, standard solutions, schedules of treatment, and catalogue of implements. Highly recommended.

READING IN ECOLOGY, by E. J. Kormondy (editor). Prentice-Hall, Englewood Cliffs, New Jersey. 1965. Pp. 219. Illus. Paperback, $3.95. This compilation of papers covering a wide range of ecological literature is intended primarily as a textbook supplement for beginning college students in ecology, or general science, or for high school students in advanced biology. However, post graduate research workers will find these papers suitable review sources. The many papers are grouped under (1) early natural history; (2) the physical and chemical environment; (3) the study of communities; and (4) the concept of the ecosystem. Highly recommended.

THREE CENTURIES OF MICROBIOLOGY, by H. A. Lechevalier and M. Solotorovsky. McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. 10036. 1965. Pp. 536. Illus. Paperback, $4.95. The purpose of the authors has been to reconstruct the growth of microbiology, stressing the main lines of development and in this they have been successful. The chapter headings are: From Fracastoro to Pasteur; Pasteur; Koch; bacteria as agents of disease; immunology, cellular and humoral; from soil microbiology to comparative biochemistry; viruses and Rikettsiae; mycology; protozoology; chemotherapy; and genetics. This stimulating text is highly recommended.

PLANT LIFE LIBRARY—continued on page 70.

# 1. REGIONAL ACTIVITY AND EXHIBITIONS

## THE 1965 AMARYLLIS SHOWS

The Official Amaryllis Shows for the year 1965 began April 3—4, with two shows on these same dates—the Corpus Christi (Texas) Show, and the Men's Amaryllis Club of New Orleans Show. Then followed in succession the New Orleans Amaryllis Show staged by the Garden Circles Amaryllis Club on April 10—11; the Houston Amaryllis Society Show on April 17; the Greater Gulf Amaryllis Show at Mobile April 17—18; and April 24—25, the two shows: the Hattiesburg (Miss.) Amaryllis Society Show and the first Southern California Amaryllis Show at Arcadia, Calif., staged by the Southern California Hemerocallis and Amaryllis Society.

Mrs. Polly Fox, Corresponding Secretary, of the Greater Houston Amaryllis Club, reports that "Although we had a rather mild winter, the month of March was very cold and overcast and our Amaryllis did not develop enough blooms of show quality to warrant a show. This was very disappointing to us all. We will be in there pitching to put on a good show next year. The date of April 17 (the Sunday after Easter) has been reserved for the Garden Center to accommodate the Show."

## 1965 CORPUS CHRISTI AMARYLLIS SHOW

MRS. CARL C. HENNY, *President,*

*Coastal Bend Amaryllis Society, Corpus Christi, Texas*

The Coastal Bend Amaryllis Society conducted its annual Amaryllis Show in conjunction with the Lola Forrester Flower Show, held here in the Exposition Hall, April 3rd and 4th, 1965. Due to very unpredictable weather conditions this winter, our exhibit was not as good as we had hoped for. We had only 67 entries of *Amaryllis* in comparison to 96 entries of last year.

Among the pot-grown registered Leopoldii Type entries were: 'Franklin Roosevelt', 'Front Page', 'Mother's Day', 'Brilliant', 'Champion's Reward', 'Masterpiece', 'Rocket', 'Prima Donna', 'Spring Dream', 'Apple Blossom', 'Ace', 'Candy Cane', 'Fantasy', 'Early White' and 'Ludwig's Dazzler'. Members receiving blue ribbons in these were Mr. Charles Sanders and Mrs. L. Materne; red ribbons were received by Mr. H. E. Lemoine, Mrs. Carl Henny, Mrs. L. Materne and Mr. Sanders.

Mr. Fred Jones received a blue ribbon in the "Breeder's Class" for his seedling—'Dutch to Dutch'.

In the Garden-grown registered and named plants, Mrs. Carl Henny received a blue ribbon for 'Prima Donna'. Mrs. E. L. Caldwell received a blue ribbon on her cut scape garden-grown, unnamed.

In the Miniature—Gracilis type, Mr. H. E. Lemoine received a blue ribbon for his 'Fire Fly'; Mr. Charles Sanders, blue for his 'Little Sweetheart' entry.

An added attraction to our exhibit was an outstanding flower arrangement of amaryllis blossoms prepared by Mrs. E. L. Caldwell, a member of our Society.

Another display of equal interest and importance was a Special Exhibit prepared by Mr. Fred Jones, club member,—entitled "From Seed to Mature Plant". Mr. Jones received a "Green Ribbon Special Award" for this display.

Three Accredited National Amaryllis Judges from San Antonio, Texas were here to judge our show. Twenty two blue ribbons, 15 red ribbons, 12 gold ribbons and three white ribbons were awarded, making a total of 52 awards.

## OFFICIAL MEN'S AMARYLLIS CLUB SHOW NEW ORLEANS 1965

JAMES E. MAHAN, *Show Standards Chairman,*

*3028 Palmyra St., New Orleans, La. 70119*

The eighth annual show was held by the Men's Amaryllis Club of New Orleans, Inc., on April 3rd and 4th, 1965 at the Edward Hynes School, 990 Harrison Avenue. As in the past the show was all horticulture devoted exclusively to *Amaryllis* with competition open to the public. It attracted numerous entries other than those of club members and drew many visitors not only from New Orleans but also from other points in Lousiana, Alabama, Mississippi, Texas and even from Kingston, Jamaica. The show was well conceived by Show Chairman Walter Latapie and set up in accordance with official rules as set forth by the American Amaryllis Society with which the local club is affiliated. Nine Official Amaryllis judges made the various awards.

The usual ribbons for first, second, third and honorable mention were awarded in the various sections and classes. In addition to ribbons the following trophies were awarded: Jessee Nursery Gold Cup for best Dutch hybrid, to Rodney Broussard; Reuter Seed Co., Inc., Gold Cup for sweepstakes winner in Dutch hybrid, to Rodney Broussard; Swetman Silver Cup for runner-up in Dutch hybrid class, to Rodney Broussard; Swetman Amaryllis Garden Silver tray (challenge) for winner of most blue ribbons in Dutch hybrid class, both potted and cut specimens, to Rodney Broussard; the President's trophy Gold Cup for most blue ribbons won by a member of the Men's Amaryllis Club, to Rodney Broussard; W. J. Perrin Silver Tray for outstanding registered specimen in owner's possession for one year or more, to Rodney Broussard; Alatex Construction Service, Inc., Gold Cup for best home-bred, grown and developed Amaryllis, to E. M. Beckham.

American Amaryllis Society Awards of Merit were given to Messrs. Beckham, and Broussard and Preliminary Commendations went to Messrs. Beckham, Milo Virgin and W. C. Creecy.

The Alatex trophy which was donated through the courtesy of Mr. Lewis Lloyd, a member of the Men's Amaryllis Club, is a new addition to the list of trophies and is designed to encourage the individual enthusiast to ''start from scratch'', from selective breeding and then bringing to maturity and exhibiting the results of his own efforts. This, in turn, will encourage others to follow the same course and thus further increase breeding and development of new clones by the amateur. The W. J. Perrin award, new this year and donated by another member of the club, is also designed to encourage exhibitors to exert themselves toward positive action on their own part to bring the plants to perfection through their own efforts rather than accept and exhibit a ''ready-made'' package which is the result of someone else's handiwork.

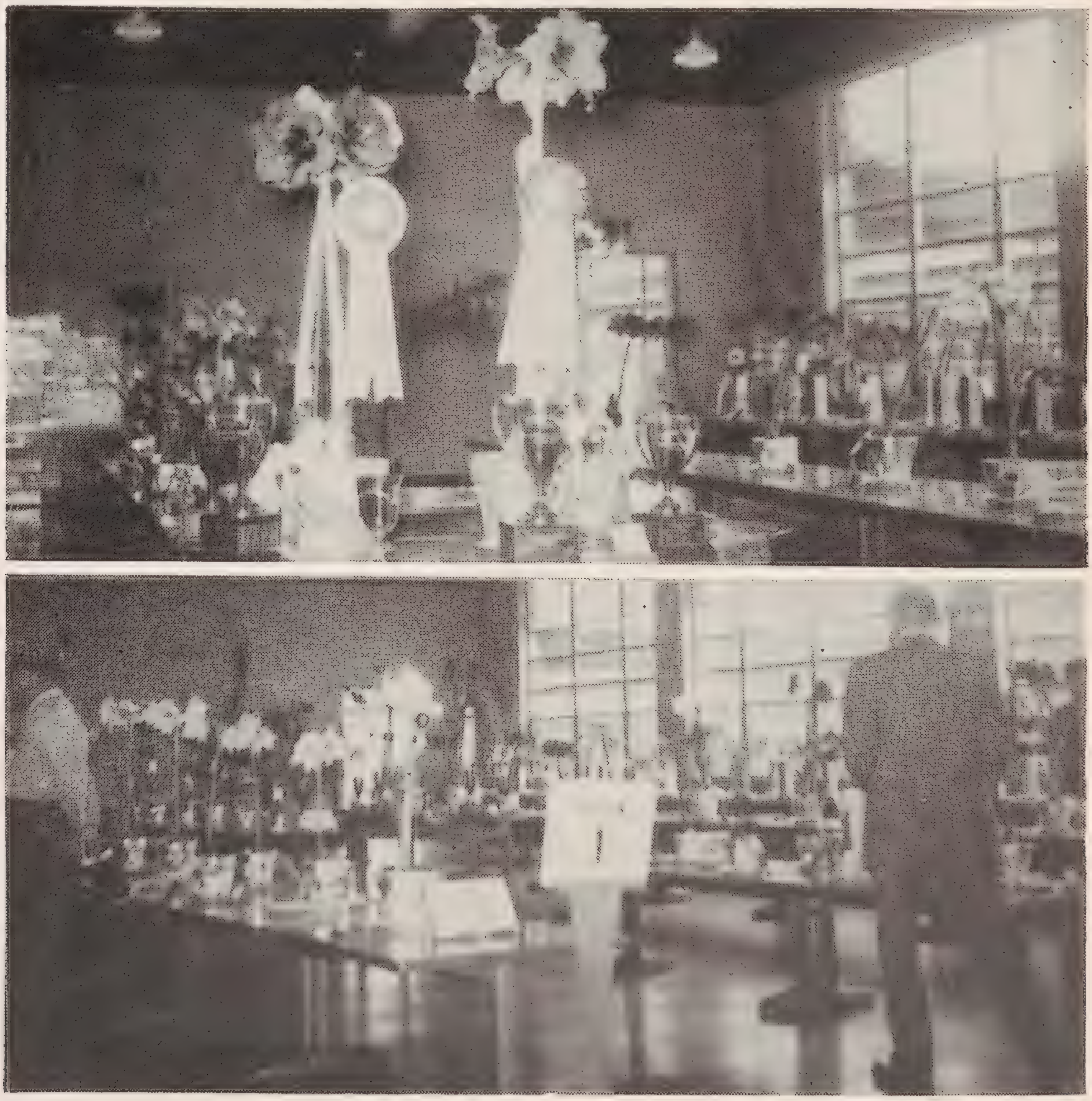

Fig. 7. Part of exhibits at the Men's Amaryllis Club Show, New Orleans, 1965.

The rewards of one's own breeding efforts were amply demonstrated by an exhibit in the show, entered by Mr. Walter Latapie, who developed a new double specimen, nearly pure white (see Fig. 13) with merely a few red lines in some of the inner petals. It is a very handsome and striking seedling which certainly must be satisfaction and incentive enough to the breeder to continue his efforts.

Plans for the coming year's show are already in progress and we are looking forward to an even greater show when next spring rolls around. The date has been set for April 16th and 17th, 1966 and a cordial invitation to attend the show is extended to all *Amaryllis* lovers.

## 1965 OFFICIAL NEW ORLEANS AMARYLLIS SHOW

Mrs. A. R. Oddo, *Show Chairman,*
*435 Bonnabe Blvd., Metairie, La. 70005*

The 16th Official Amaryllis All Horticulture Amaryllis Show was held Saturday, April 10th and Sunday, April 11th, under the sponsorship of the Garden Circle Amaryllis Club. Mrs. A. R. Oddo was general chairman, and Mrs. Ed. Landry, Club President was honorary chairman.

The Award of Merit for the best specimen of Dutch Horticulture, presented by the American Amaryllis Society, went to Edward Beckham of Baton Rouge, La. for a A Happy Memory entry which also was awarded the Ludwig Challenge Cup. The Reuter Seed Company Tray for the most outstanding Dutch Specimen also went to the Award of Merit Winner in Dutch Horticulture Mr. Edward Beckham.

The Award of Merit for the best specimen of American Horticulture went to Miss Elizabeth Weed. The Harry St. John Memorial Challenge Trophy for the most outstanding American specimen also went to Edward Beckham. Awards of Merit, presented by the American Amaryllis Society, for specimens in American horticulture, went to Edward Beckham and George Merz, Jr.

The Klein Award, Silver Tray for the most blue ribbons in Dutch Horticulture, went to Edward Beckham.

The Sweepstakes trophy a gold cup for the most blue ribbons in American Horticulture was presented to Mrs. Walter R. Latapie of the Garden Circle Amaryllis Club who also won the Single Floret Award to Members Only.

A special award, A Silver Tray, for the best two-floret entry went to James Robertson of the Men's Amaryllis Club of New Orleans, La.

Awards of appreciation went to non competitive arrangement exhibitors as follows: Mrs. Fernando Cuquet, Sr., Mrs. Richard Heaney, Mrs. John Hennessy, Mrs. A. L. Herberger, Mrs. Casey W. Jones, and Mrs. Tully Ward.

Blue Ribbon winners in Dutch Horticulture were Milo C. Virgin, Melvin Zivicki, George Merz, Jr., Edward Beckham, Mrs. Miriam G. Authement, Mrs. Edna Dopp, Mrs. W. J. Perrin, and James Robertson.

Blue Ribbon winners in American Horticulture were Mrs. W. R. Latapie, Mrs. W. J. Perrin, Mrs. F. L. Ramos, Mrs. A. A. Autry, Miss

Edith Dickenson, Mrs. Rosina Tamburello, Mrs. Miriam G. Authement, Melvin Zivicki, Mrs. W. C. Creevy, Miss Elizabeth Weed, Miss Antoinette Weed, Santo Cuchinotto, Mrs. E. Dopp, Mrs. Jessie Solis, and Mrs. Josie Davis.

The Gold Cup the Public School Award won for the past five years by McDonogh #7 School was presented to them for permanent possession.

The Award of Merit were presented as follows: Mr. Edward Beckham, 'Happy Memory', Mr. Edward Beckham, 'Zenith', Mr. Edward Beckham, 'Streaking Stripes', Mr. Edward Beckham, 'Carousel', Mr. Geo. Merz, Jr., 'Alcyone'.

Preliminary Commendations were presented as follows: Miss Elizabeth Weed, Named American 'Gernato'; Milo Virgin, White Seedling; Mrs. Walter R. Latapie, White Double Seedling; Miss Edith Dickenson, Pink Seedling; Melvin Zivicki, Pink Dutch Seedling.

There were six Invitational Arrangements displayed on Pedestals by non Competitive Guest Artists. The 16th Official Amaryllis Show was displayed by Divisions 1 to 9 as per Revised Show Schedule for Official Amaryllis Shows (in 1961 Amaryllis Year Book). There were 228 entries in the Show.

## 1965 OFFICIAL HOUSTON AMARYLLIS SHOW

Mrs. A. C. Pickard, *Show Standards Chairman,*

*1702 North Blvd., Houston, Texas 77006*

The Houston Amaryllis Society's Official Show was held in the auditorium of the Garden Center, April 17, 1965.

It was based on the theme, ''Amaryllis on Parade''. The weatherman was very temperamental and full of tricks, so many sudden changes. However, the dark clouds turned to silver and the Society staged a very successful show.

Classification in the five divisions included named and registered Dutch cultivars and American hybrids by color, with separate sections, including the cut and potted specimens.

In addition to the classes of cultivars, specimens of more than one hundred seedlings were displayed on a non-competitive basis, all grown by members of the Society.

Collections, minimum of five named and registered cultivars, all different, added extra beauty in the collection class.

All classes were judged by official Amaryllis judges.

Special ribbon awards were given in the invitational class for cut specimens of named and registered Dutch and American Amaryllis.

The Educational exhibit consisted of methods of propagation from seed to clone; and a sexual propagation of bulbs. This section merits horticultural achievement on the highest level.

Much interest centered around the Amaryllid section of potted ''Clivia'' in full bloom; and cut specimens of *Crinum* x *powellii album,* and *Ornithogalum.*

In the Artistic Division of the show (non-competitive), members were given an opportunity to show their talents as creative artists in flower arrangement.

One of the most interesting special exhibits of the show was ''Easter Parade'', displayed on the stage of the auditorium by a local florist which could only be rightly portrayed in Kodachrome.

The special awards table, staging all the medal winners was the center of attraction and proved the outstanding success of the show:

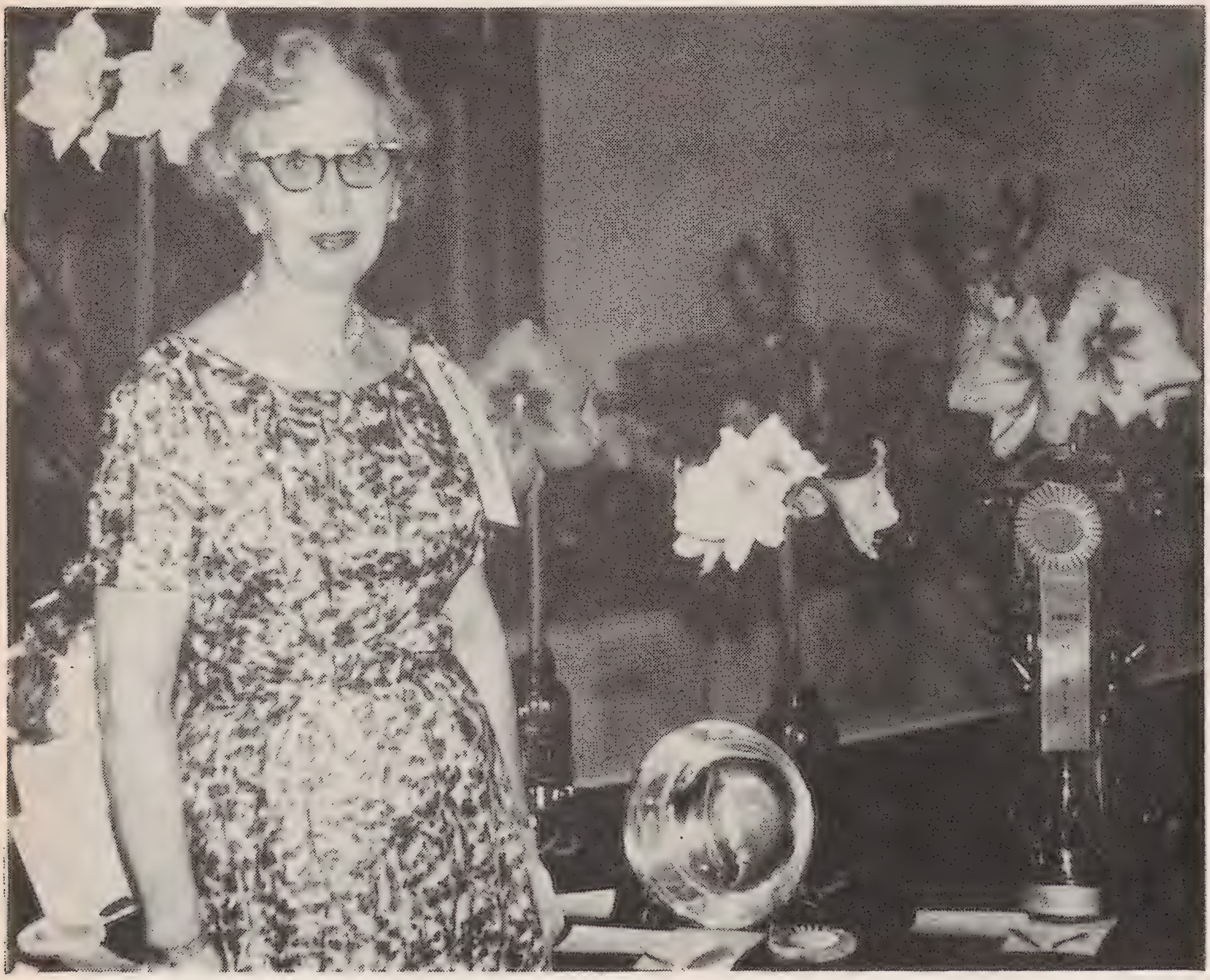

Fig. 8. President, Mrs. Tracy T. Word, at the special awards table, Houston Amaryllis Society Show, 1965.

'Square Dance' (Lud) R; A-704, D-5B, A.M. and award of Excellence—Mrs. H. W. Blair

'Boquet' (Lud) R; A-424, D-5A, A.M. & Ludwig Cup—Mr. M. B. Quigles

'Maria Goretti' (Lud) R; A-445, D-5B, A.M.—Mrs. T. T. Word

'Fire Fly' (Lud) R; A-469, D-8, A.M.—Mrs. M. E. Shelton

Collection of 5 named and registered Dutch Cultivars, A.M.—Mrs. A. C. Pickard

'Spring Dream' (Lud) R; A-542, D-5A
'Television' (W-WS) R; A-691, D-5A
'White Crane' (Goed) R; A-681, D-5B
'Apple Blossom' (Lud) R; A-422, D-5B
'Catherine Valente' (W-WS) R; A-688, D-5B

Breeders Class, ''American Seedling'' P.C.—Mrs. R. I. Stansbury

Breeders Class, ''Dutch Seedling'', P.C.—Mr. M. B. Quigles

Non-competitive, Invitational Class: 'Apple Blossom' (Lud) R; A-422, D-5B—Mrs. E. R. Bertgstrom; 'Reginae hybrid' - D; 4-B, P.C.—Mr. Earlton Koon

The Houston Junior Amaryllis Society and Junior Garden Club, sponsored by the Houston Amaryllis Society, presented their section of exhibits on horticulture, nature and conservation, and an educational display.

This year introduces the first in classes of Artistic Design and a class of dish gardens and terraniums with naturalistic planting.

Junior sections are given increasing prominence with more Junior exhibits a ''natural'' for their talents.

Another year of most interesting and rewarding effort has come to a close for a plant society of great appeal and which furnished a wealth of excellent horticultural information.

## GREATER GULF AMARYLLIS SHOW, MOBILE, 1965

MISS MILDRED LAUGHLIN, *701 Dauphin Isle Parkway,*
*Mobile, Alabama 36606*

The Amaryllis Society of Mobile, Alabama presented AMARYLLIS EASTER PARADE at their Thirteenth Annual Greater Gulf Amaryllis Show on Saturday and Sunday, April 17 and 18, 1965, in the Murphy High School Cafeteria; admission free.

The focal point of interest was a large white cross in the center of the building with Amaryllis attractively arranged at its base. The artistic Designs were calculated to carry out the theme further.

Officers of the Society for 1964-1965 are as follows: President, W. A. McCollum; Vice-President, S. A. Shannon; Secretary, Mrs. A. B. Palmer; Treasurer, J. C. McRae.

S. A. Shannon officiated as Show Chairman and Master of Ceremonies; and serving as his Co-Chairmen were: W. A. McCollum, Russel Ludlow, J. C. McRae.

Standard Judging was done by accredited judges and trainees from Mississippi and Florida.

Beautiful silver trophies were won by the following:

W. A. McCollum, Winner of the most Blue Ribbons in Show, including Horticultural and the Artistic Arrangements Division. Sterling Silver Paul Revere Bowl.

Mrs. M. E. Chancey, Winner of the most Blue Ribbons in the Artistic Arrangements Division. Sterling Silver Vase.

W. A. McCollum, Winner of the most Blue Ribbons in the Combined Dutch Hybrid Potted and Cut Amaryllis Divisions. Large Silver Tray with handles.

Mrs. Gertrude Marshall, Winner of the most Outstanding Horticultural Potted Bulb Specimen of Dutch Amaryllis in Show. Sterling Silver Sandwich Tray.

W. A. McCollum, Winner of the most Blue Ribbons in the Dutch Hybrid Potted Amaryllis Division. Silver tray with handles.

W. A. McCollum, Winner of the most Outstanding Horticultural Potted Bulb Specimen of American Hybrid Amaryllis in Show.

Mrs. W. P. Cazalas, Winner most Outstanding Artistic Arrangement of Amaryllis in Show.

Mrs. Virginia Sherwood, Winner best painting of Amaryllis (Adult Section).

Maxey J. Roberts, Winner Best Painting of Amaryllis. (Student of Art 16 years of age and under.)

Herbert O. Hackmeyer, Winner most Outstanding Horticultural Cut Specimen of Dutch Amaryllis in Show.

Mrs. H. R. Young, Winner of the most Blue Ribbons in the Dutch Hybrid Cut Amaryllis Division.

W. C. Strain, Winner most Outstanding Horticultural Cut Specimen of American Hybrid Amaryllis in Show.

Rose Garden Club, Trophy awarded for the Blue Ribbon Winner in the Invitational Class (Open to Garden Clubs only.)

Mrs. W. A. McCollum, winner most Artistic Design of Amaryllis with Elements other than Fresh Plant Material Predominating.

Miss Darby Hickson, Winner Trophy awarded to the Junior with the Most Blue Ribbons.

The following won Annual Awards to be retained by the first year winners permanently: W. A. McCollum, winner most Blue Ribbons in the Dutch Named Clones. Sterling Silver Cup. Maxwell E. Stewart, winner most Blue Ribbons in the Single Bloom Named Division.

Wilmer Smith was winner of four trophies as follows: Most Outstanding Hobby Collection of Amaryllis. Silver Cup; Most Blue Ribbons in the Unnamed Cut Seedlings. Silver Bowl; Most Blue Ribbons in the unnamed potted seedlings. Silver Bowl; Most Blue Ribbons in the Single Bloom Unnamed Division.

In addition to these lovely trophies The Men's Garden Club of Mobile gave a Certificate of Honor awarded for Best American Hybrid Seedling (In Horticulture) Shown for First Time and it was presented to W. A. McCollum.

The trophies and awards were presented to the winners at 4 P. M. Sunday, April 18th at the Show.

Both President W. A. McCollum, and Show Chairman S. A. Shannon, stated that the membership had done outstanding work in presenting the show along with the very able assistance of the following judges: Mrs. W. S. Barlow, Mrs. Jessie Barfield, Mrs. E. S. Northup, Mrs. Riley

Moffett, Mrs. Florence Renau, all Pensacola; Mrs. M. G. Ness, Mrs. Dewey Regan, both from Biloxi, Miss., and the following from Hattiesburg, Miss.: Mrs. M. M. Thomas, Mrs. R. A. Fowler, Mrs. U. J. Lucas, Mrs. Charles Bell, Mrs. B. P. Russum, Mrs. B. M. Lewis, Mrs. Sam Forbert, Mrs. J. W. Snowden, Mrs. F. T. Newton, Mrs. I. M. Culpepper, and Mrs. L. M. Davis.

## 1965 OFFICIAL HATTIESBURG AMARYLLIS SOCIETY SHOW

Mrs. Luther N. Davis, *Society President*

*2206 Hardy Street, Hattiesburg, Miss.*

The officials of the Hattiesburg Amaryllis Society have marked ''Complete Success'' across their records for the 1964-65 society year that came to a close with the staging of the Society's Fifth Annual Show that was in every respect the most successful in the history of the organization.

Even though the weather during the winter had been most unfavorable in this area the enthusiastic members of the Society and their host of friends who are growers and exhibitors of this majestic flower showed both courage and skill in bringing their *Amaryllis* through the dreadful winter with very little noticeable damage.

From a very small beginning when the Society was organized, July 14, 1956, the interest has steadily increased until today the Hattiesburg Amaryllis Society has taken its place among the largest and most alert groups in the entire country, and its shows rank with the best anywhere.

Outgrowing the show rooms of the Hattiesburg Garden Center, the show this year was moved to the Community Center which afforded a highly appropriate place for the hundreds of exhibits that were of unusually high quality. The show was open Saturday evening and Sunday evening (April 24-25) and hundreds of visitors from several states viewed the magnificent showing of the majestic *Amaryllis* exhibited by local growers.

The horticulture section of the show was especially strong this year with a profusion of potted Dutch hybrids with first places going to displays of 'Cardinal', 'Lucky Strike', 'White Giant', 'Happy Memory' and many others. Mrs. L. T. Brown, Mrs. Charlie Bell, Mrs. A. M. Wilson and Mrs. R. A. Fowler were winners in this category.

In the seedling category first place awards went to Mrs. O. F. Coursey, Mrs. Charlie Bell, Mrs. Sam Forbert and Miss Evelyn Arledge.

Mrs. Charlie Bell won the American Amaryllis Society Award of Merit Certificate for her 'Faust' and 'Albino'. An American Amaryllis Society Award of Merit went to Miss Evelyn Arledge of her Candy Cane.

In the artistic design section where the theme ''Motion In Space'' was appropriately carried out, Mrs. B. M. Lewis won first place, and she also won the Tri-Color Award in this category.

In the exhibition table display firsts went to Mrs. B. M. Lewis and Mrs. Paul Bailey.

Highly coveted silver tray awards were made to Mrs. Charlie Bell who won the President's Award and the horticultural sweepstakes award. Mrs. Sam Forbert gained the silver tray for the best potted *Amaryllis* in the entire show while Miss Evelyn Arledge won the silver award for the best potted specimen of Dutch *Amaryllis* in the show. Mrs. Melvin Thomas won a silver award for the best cut bloom in the show. The tray for the most blue ribbons in the show in the Dutch Hybrid Class went to Mrs. Leonard Brown while Mrs. Charlie Bell gained the award of a silver tray for the most outstanding unnamed seedling in the show.

In the single bloom category blue ribbons were won by Mrs. Luther N. Davis, Mrs. O. F. Coursey, Mrs. Ruth Bethea, Mrs. L. T. Brown and Mrs. Knox Cole.

Space will not permit a full description of this outstanding show but all agreed that in both quality and quantity it was the most outstanding exhibition of the Society's entire history. Attendance at the show broke all previous records and many visitors have assured the Society that next year will find them among the exhibitors.

The Hattiesburg Amaryllis Society is well on its way with enlarged plans for the new year and it is looking towards the spring show with an abundance of enthusiasm.

## FIRST SOUTHERN CALIFORNIA OFFICIAL AMARYLLIS SHOW 1965

MRS. BERT WILLIAMS, *Show Chairman,*
*2601 La Prensa, South San Gabriel, Calif. 91777*

The first Official Amaryllis Show ever to be held in Southern California was staged at the Los Angeles State and County Arboretum, 301 N. Baldwin Ave., Arcadia, Calif., by the Southern California Hemerocallis and Amaryllis Society on April 24 and 25, 1965.

The show was a real success in spite of uncooperative cold weather, which had delayed most outdoor spikes, and despite the fact that much of the display hall had been relinquished to the spring flower show, which had been rained out twice on earlier scheduled dates. By dint of diligent searching by the show committee, a very substantial number of exhibitors participated and had entries in a large part of the scheduled twenty-two classes. Over eight thousand visitors came through the turnstiles at the main gate, indicating a very creditable attendance for this first show.

Awards included the S. August Phillips Trophy, given to Mr. Hubert C. Lloyd for the best seedling, a fine orange scarlet; the President's Trophy awarded to Mrs. Eva Turnquist for the most popular exhibit in the show, an extremely beautiful potted specimen of 'Purple Queen' (Warmenhoven); the sweepstakes prize, the Cecil Houdyshel

Memorial Trophy, a handsome silver bowl perpetual trophy established to honor Cecil Houdyshel, who died in 1964, went to Mr. W. Quinn Buck, who had the largest number of blue ribbons in various classes. *Amaryllis* bulbs were given as awards to the winners of blue ribbons. Many of these bulbs were fine new Dutch clones donated by Mr. Robert Goedert, of Jacksonville, Fla., a leading importer.

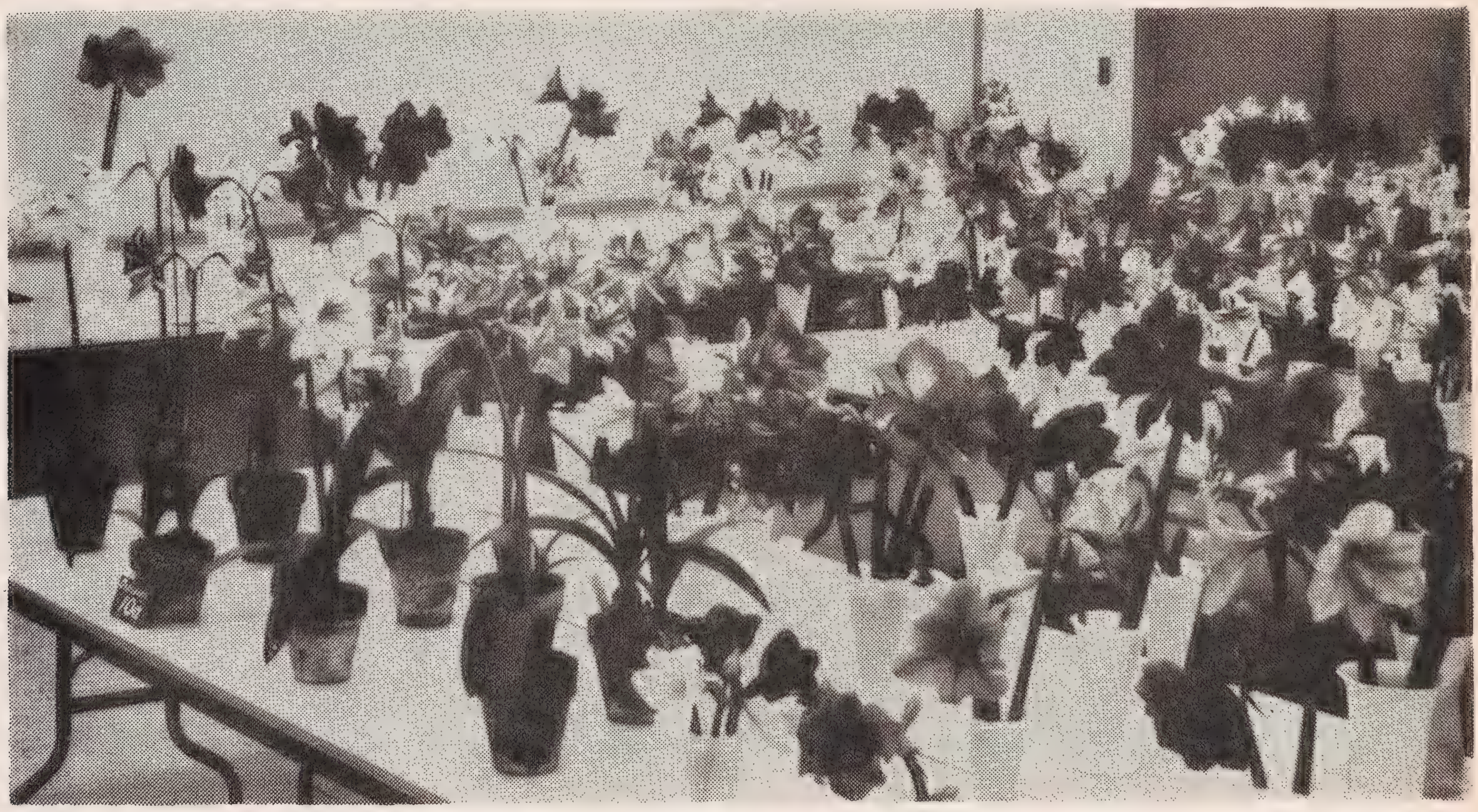

Fig. 9. Part of the exhibits at the First Southern California Amaryllis Show, 1965. Photo by Jack V. McCaskill.

A special award was given for the three beautiful amaryllis arrangements shown by Chadwick Gardens of Redondo Beach, Calif. Although not in competition, these arrangements were most outstanding for the quality of the white, rose, and salmon scarlet Dutch strain seedlings used to make them up, the rose group being especially fine in color, shape, and texture.

## EMPHASIS ON JUDGING AMARYLLIS

Mrs. A. C. Pickard, *Houston, Texas*
*Official Amaryllis Judging Instructor*

There is a growing consciousness that working knowledge of horticulture is a vital part of our growing the plants and judging them at flower shows which feature a particular flower, and where at least a year's study and cultivation of this flower precedes the show.

People who exhibit *Amaryllis* would be much better exhibitors if they would take a little time to study the rules for Amaryllis shows by which all Amaryllis Judges work.

The primary objective of the Judges Training course is to train Judges and up-grade judging standards. A judge must be of unquestioned integrity, and should have the interest of the Amaryllis Society at heart.

The importance of membership in the American Amaryllis Society (A. A. S.) was recognized very early after its founding. A candidate for a judgeship must be a member of the A. A. S. and have a record of attendance at Judges' Training Schools. As long as progress is being made in all classes of Amaryllis, the Judges Training Program must be considered in terms of continuous effort to provide the highest possible standard of judging.

Your A. A. S. gives you a classification system for all Amaryllis designed to maintain order and recognition for all species, named and registered, and unnamed horticultural clones.

A registration system is used to prevent chaos about clones in commerce. An award system gives full recognition of clones of outstanding quality and promotes development of new classes of Amaryllis.

It is possible that in future years, other specialized awards may be instituted by the Society in recognition of interest and progress in various special sections of the Amaryllis tribes.

Remember, judging is not difficult if you retain an open mind and a knowledge of the flower you are judging. Never be afraid to ask questions which might help you with a decision. No one is expected to know everything.

With descriptive catalogues from leading hybridizers, we enter a new era of Amaryllis production, and it is evident the new systems, based on their horticultural qualities, will provide the key to better understanding of the nine major classification divisions and additional necessary categories.

It is impossible to deal with all the conceivable factors which may arise in judging. Otherwise, the subject would become so technical and complicated that it would defeat its purpose. Those who are just getting acquainted with Amaryllis may find certain descriptive terms puzzling.

The following short glossary will explain some of the words and terms used in Amaryllis language:

(a) Species—kinds of plants as they appear in nature before hybridizing.

(b) Hybrid—a plant resulting from the cross between two parents differing in one or more traits: i.e.—a cross between two species, a species and a hybrid, or between two hybrids.

(c) Cultivar—kinds that are maintained under cultivation; may include cultivated species and hybrids.

(d) Perigone—a flower form in which the free divisions above the tepal tube are similar and arranged in a circle, surrounding the sexual organs of the plant—pistil and stamens.

(e) The six segments—3 outer are setegs, and 3 inner are petsegs; when taken together they are known as tepalsegs, or the limb.

All visible parts of the Amaryllis must be recognized in relationship to the whole. It is evident that there are many qualities which could be given importance in judging.

Point scoring should be followed and used to assess the relative importance of the different qualities specified, and all qualities must have ample consideration from the judges.

Competitive entries must be made according to divisions and classes included in the comprehensive schedule.

To judge a horticultural specimen, one attempts to measure perfection or quality and the faults.

Certain factors have been considered and a scale of points ranging from 0 to 100 established for scoring a specimen. Every judge is an individual with ideals of perfection and his own ability to see how nearly the flower before him matches his ideals.

At this point it may be helpful to elaborate a bit upon the several characteristics rated on the score card.

*The form* of the flower is the basis of classification. By this method genera, species, and varieties are identified and named within these gradations of form. Types can be recognized and workable definitions of these types can be written, permitting the classification of all Amaryllis according to type.

In Divisions 2 and 3 drooping is normal and should not be penalized but in other divisions, the somewhat more erect form is favored.

However appealing a certain Amaryllis may be to its owner, however artistic he may regard its formation, to win in a show it should excel by most nearly attaining a recognized standard of excellence in respect to form.

To add to point scoring, every flower has various attributes, physical or otherwise that make it more or less beautiful. Point scoring is simply the numerical expression of the value of each characteristic, point by point. The total points comprise the numerical rating by means of which you can compare the flower to another of like kind. The most natural way to appraise anything is to compare it with other similar kinds. Do not hesitate to use Point Scoring, for there is no more useful tool when wisely used.

*Flower shape (form)* receives 15 points and refers to shape of the bloom, stage of development, seg formation, conformity to type or variety.

*Color*—note that nearly half of the total points, 45, have been alloted to color, due to the fact that color is the most important attribute of an Amaryllis. The quality of the color may be notably enhanced by the texture of the segs. Texture is the term employed to describe the surface of the segs. The segs may have a dull texture, or satiny sparkling texture which veritably makes the flower ''sing''.

Color quality may respond to a certain extent favorably to cultural care, skillful handling of sunlight or shade, fertilizing, soil ingredients, climate moisture, etc.

Not to engage in an exhaustive discussion of the theory of color, it may be useful to point out the lighter tones of any color produced by reduction of the color content by white, diminishes the intensity of color, changing its tone or color value without altering its clarity.

In self colored Amaryllis, study the spread of color on the floral segs. It should be even, not streaked or veined.

In blends, there should be harmonious contrasting component colors. Otherwise, harshness results.

Bi-color is a clear separation of the contrasting colors with a minimum blending of darker into lighter color components. Preferably all segs should carry a substantial proportion of each color on its face. ''Striped'' refers to vertical bands or stripes of different colors.

*Size*—score value 15 points: Size is another character which is related directly to the division standard. In miniatures (intermediates) smallness contributes to daintiness. The pose of the flower on the scape is important enough to give it point consideration. For example—the Leopoldii hybrids being formal and flat have an asset in size. In certain Reginae hybrids (the less formal), if the flowers were too large they would be out of proportion in form.

*Length and character of scape*—score value 15 points: This character too represents harmony. It should be in proportion to the size and number of blooms. A strong, erect, graceful scape a trifle too long, other things being equal, is preferable to one too short. Heavy scapes with small flowers sometimes indicate forcing and, this condition destroys the gracefulness of the effect.

*Number of flowers* per scape and number of expanded flowers—rating 6 points: Buds are not considered expanded flowers but contribute toward classification and separation of judging a two flower scape with no evidence of another flower in competition with two expanded blooms and a bud. Only 3 or more flowers per scape are eligible for competition. For two expanded flowers per scape allow 3 points; for 3 flowers allow 4 points; for 4 or more flowers allow 6 points; Usually more than 4 open blooms per scape seem too crowded for good form. In miniatures, allow 4 points for 2 flowers and 6 points for 3 or more flowers. Miniatures flowering habits are from 2 to 6 flowers per scape.

*Number of scapes per plant*—allow 10 points: This category applies only to potted exhibits. Allow 8 points for one scape; 9 points for 2 scapes; 10 points for three scapes. It is hardly likely that any entry of three scapes will reveal no faults in any of its characteristics and is rarely seen in a show.

*Fragrance—alloted 2 points*: Amaryllis are not noticeably fragrant and the presence of fragance is to be considered an asset. Some few species are recorded as slightly fragrant. If so, it is passed on in future generations. New fragrances have been produced from time to time but such new introductions will never permeate the home gardens with the delightful fragrance of a rose. Many flowers produce nectaries for the production of nectar and are of value in attracting insects that transfer pollen to the stigma of the blossoms thus carrying out pollination in nature.

*Foliage—2 points*: This applies to potted plants. Leaf growth that comes with the flower scape enhances the beauty, but some clones are slow to produce foliage until the flowers have appeared. Temperature control on a newly purchased bulb may have some effect on growth of foliage. A high temperature will often produce lush foliage at the expense of a bloom scape.

*Condition of exhibit*—12 points for cut specimen, 10 points for potted plants: The really superb bloom is a candidate for a category called Distinctiveness. This has to do with the staging of the exhibit as well as with those attributes which tend to make it stand out supreme and proclaim its quality. A keen judge quickly recognizes the difference between a bloom scape casually stuck into a container and one whose scape is properly proportioned. Plants are too often injured in transportation to a show. The injuries will affect judging value.

*Ten (10) points alloted for potted plants*: Our score card takes full account of every factor which actually goes into the condition of an exhibit. Plants in prime condition are to receive full allowance points. It is permissible to remove any fading scapes and flowers. Proper and skillful cultural practices will be reflected in the general condition. Prime condition exists when the bloom is clean, no fading (over maturity), or loss in substance, or injury in any part.

Another removal: Such removal is allowable by the local show schedule committee in order to prevent pollen dusting on the segs in transit, which often mars the beauty of a pure color. Over ripened pollen and position of the stigma will usually reflect the age of the bloom.

Staking: Pot plant scapes grow tall and it is necessary, sometimes, to stake them. If the stake used does not attract attention to itself and if green twistems are used for tying, then no points are deducted. If the stake or tie is too conspicuous, then some deduction must be made.

It is sometimes difficult for judges to decide the number of points to deduct for a slight defect. One method is, if a fault is barely noticeable, deduct a couple of points. If the flower is only half as good as it might be, deduct half of the points. This gives plenty of room to add or subtract a point or two where it might be necessary for a final decision. A judge should be aware of the variations due the light factor, temperature and cultural practices.

In conclusion, it is evident that there are many qualities which should be given important consideration in judging. It is necessary for the schedule to set the standard which will fit the classes and guide the exhibitors and judges.

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## AMARYLLIS JUDGES CERTIFICATES

Since the last report in the 1965 Amaryllis Year Book (pages 50-51), the following numbered Amaryllis Judges Certificates have been issued by the American Amaryllis Society:

150. Mrs. Gladys L. Williams, 2601 La Prensa Av., South San Gabriel, Calif. 91777 (Horticulture only).
151. Mr. W. Quinn Buck, 26 East Camino Real, Arcadia, Calif. 91006 (Horticulture only).

152. Mrs. Eva Turnquist, 3342 N. Muscatel, South San Gabriel, Calif. 91777 (Horticulture only).

153. Mr. Jack McCaskill, 25 South Michillinda, Pasadena, Calif. 91107 (Horticulture and Arrangements).

154. Mr. H. L. Bush, P. O. Box 1371, Columbia, South Carolina 29202 (Horticulture and Arrangements).

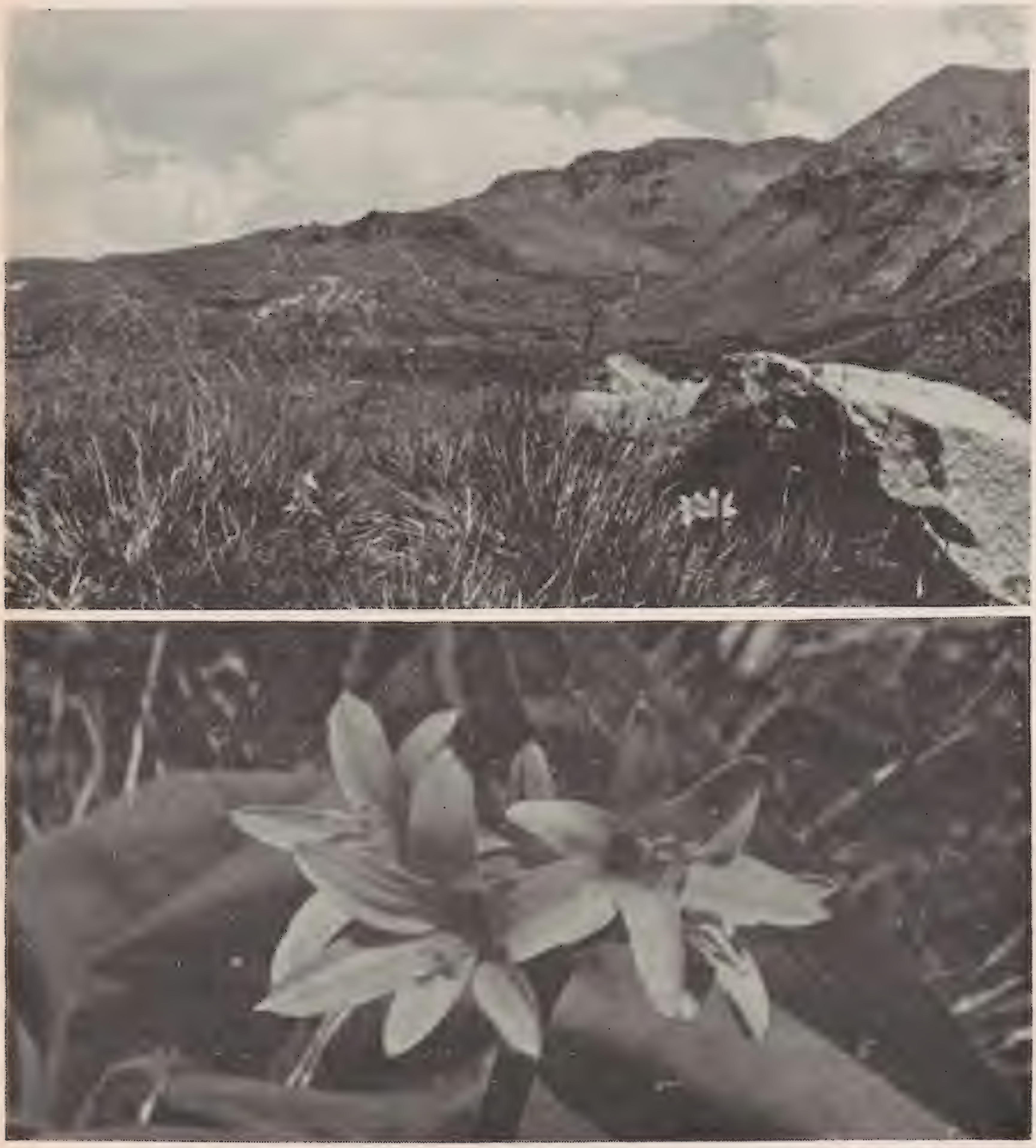

Fig. 10. Amaryllid collected by Dr. C. G. Rueppel. Upper, shows native Andean habitat; 9,000 ft. elevation at Argentine-Chile border. Lower, close-up of flowers; golden yellow in color.

# 2. LINEAGICS

[BIOEVOLUTION, DESCRIPTION, DETERMINING RELATIONSHIPS, GROUPING INTO LINEAGES]

## AMARYLLIDS COLLECTED BY DR. RUEPPEL

Joseph C. Smith, M. D.

It has always been difficult to obtain from South America as much live plant material for study as would be required to pick up some of the remaining unidentified species of amaryllids. Many botanists feel that ultimately over a hundred *Amaryllis* species alone may be described. With the seventy or so now catalogued this leaves at least thirty to go.

The Society is indebted to Dr. C. G. Rueppel, Casilla 370, Mendoza, Argentina, for collecting of two very interesting or possibly entirely new species, one in the genus *Amaryllis* and one in the genus *Rhodophiala*. Dr. Rueppel is an ardent amaryllid enthusiast who makes numerous collecting trips about the lower half of South America in search of new material. He is now in the process of retiring which takes about a year in his country, Argentina. Afterward he will have more time to travel and search out unusual plants. It is hoped he will remain in good health and able to make these trips for many years.

Dr. Rueppel recently forwarded to the writer a few bulbs of the most remarkable miniature *Amaryllis* species belonging to the striata group. The flower is long lasting about three and one-half inches in diameter with a much shorter tepaltube than in the striatas. On opening it is somewhat more formal in shape, but as it matures the aspect changes to a somewhat irregular shape, with the two lower setsegs falcate. It is even smaller than *Amaryllis traubii*. Had this one been available when the Dutch hybridizers created the Gracilis strains, real pixies would have resulted with the slender eight- to ten-inch scapes of *Amaryllis* ''Agrilaga'', the name with which this species comes to us from Santo Tomé.

Mr. Pablo Argilaga, a good friend of Dr. Rueppel for whom he names this *Amaryllis* species, lives in Santo Tomé, Corrientes. This amaryllis is stated to be growing everywhere along the banks of the Uruguay River under dense shade in ''rich, sandy, stony, peaty, wet soil.'' It produces many offsets which result in a clump of plants.

The new *Rhodophiala* species has not flowered here, but we do have two interesting photos (see Fig. 10) from Dr. Rueppel of its native habitat and close up of the flower. It is an intense yellow color. It cannot so far be placed with any of the described species and may be a new species of *Rhodophiala*. Dr. Rueppel collected it near Lago (lake) del Maule on the Chile-Argentina border at an elevation of 9,000 feet where the ground is covered with snow during the Winter months. The bulbs are deeply seated in rich, sandy loam. From the color photos this appears to be a very pretty species with flowers that may rival the yellow *Lycoris*. Nothing is known of its culture, but coming from a high mountain terrain it may require an acid soil and enough winter cold for complete dormancy.

There are so many of the *Rhodophiala* species that we are not growing in this country, and who knows how many yet undescribed species there may be, that we are much indebted to Dr. Rueppel for his service to the Society in supplying these amaryllids. He has promised to send along many others as he obtains them on his collecting trips.

## AMARYLLIS CALYPTRATA HYBRIDS REPORT, 1965

W. Quinn Buck, *Arcadia, Calif.*

Since earlier crosses of *Amaryllis Calyptrata* on two Ludwig white clones gave such interesting results, another such combination was tried in the spring of 1963. The white seed parent was a beautiful seedling tentatively named 'Peg Dabagh', selected out of a population of around 120 from a cross of Ludwig strain whites. The pollen came from one of the original *Amaryllis Calyptrata* bulbs flowered at the Los Angeles State and County Arboretum in Arcadia.

The seed of this cross were planted on April 9, 1963, and the first spike appeared on a ridiculously small seedling just a bit over two years later.

Our two pictures in Fig. 11 show side and front views of this first spike of 'Peg Dobagh' x *Amaryllis Calyptrata*. So much of the grace and charm derived from the orchid-flowered *calyptrata* parent were evident that it seemed worthy of recording this first spike. This seedling also gave no pods when selfed or crossed with named clones, as was true of the earlier crosses.

## AMARYLLIS VITTATA RE-DISCOVERED

Mrs. Robert E. Herold, *203 Cromwell Drive,*
*San Antonio, Texas 78228*

Through the efforts of Mrs. Paul A. Kane, chairman of the General Amaryllid Committee; Mr. Claude W. Davis, Professor Emeritus, Agricultural Extension Service, Louisiana State University; Sister Mary Clare, C. D. P., Academic Dean of Our Lady of Lake College and Dr. Hamilton P. Traub; at long last, I have identification on a lovely little *Amaryllis* that I have grown and enjoyed for about twenty years.

On June 2, 1965, Dr. Traub identified the botanical specimen as *Amaryllis vittata* L'Hérit., culminating ten years of asking gardeners, writing inquiries and answering letters after my mentioning of it in the 1964 Amaryllis Yearbook. (For further reference, read page 112, TRIBE AMARYLLEAE by Traub and Moldenke, 1949).

My first clone was given to me by my mother-in-law, the late Mrs. J. F. Herold of Corpus Christi, Texas who in turn had received hers from one of her daughters, Mrs. Jack Hamilton of Corpus Christi, also; her ''striped lilies'' coming from her mother-in-law, a Mrs. Hamilton of Goldthwaite, Texas.

Like genealogy, you aren't interested or don't become interested, until the ones that might know, have already gone. My brother-in-law doesn't remember where his mother secured hers, not knowing if they came from her sister-in-law who also loved and grew flowers. He remembers his mother moving bulbs with her to California after the death of his father and his sister remarking how lovely "Mama's striped

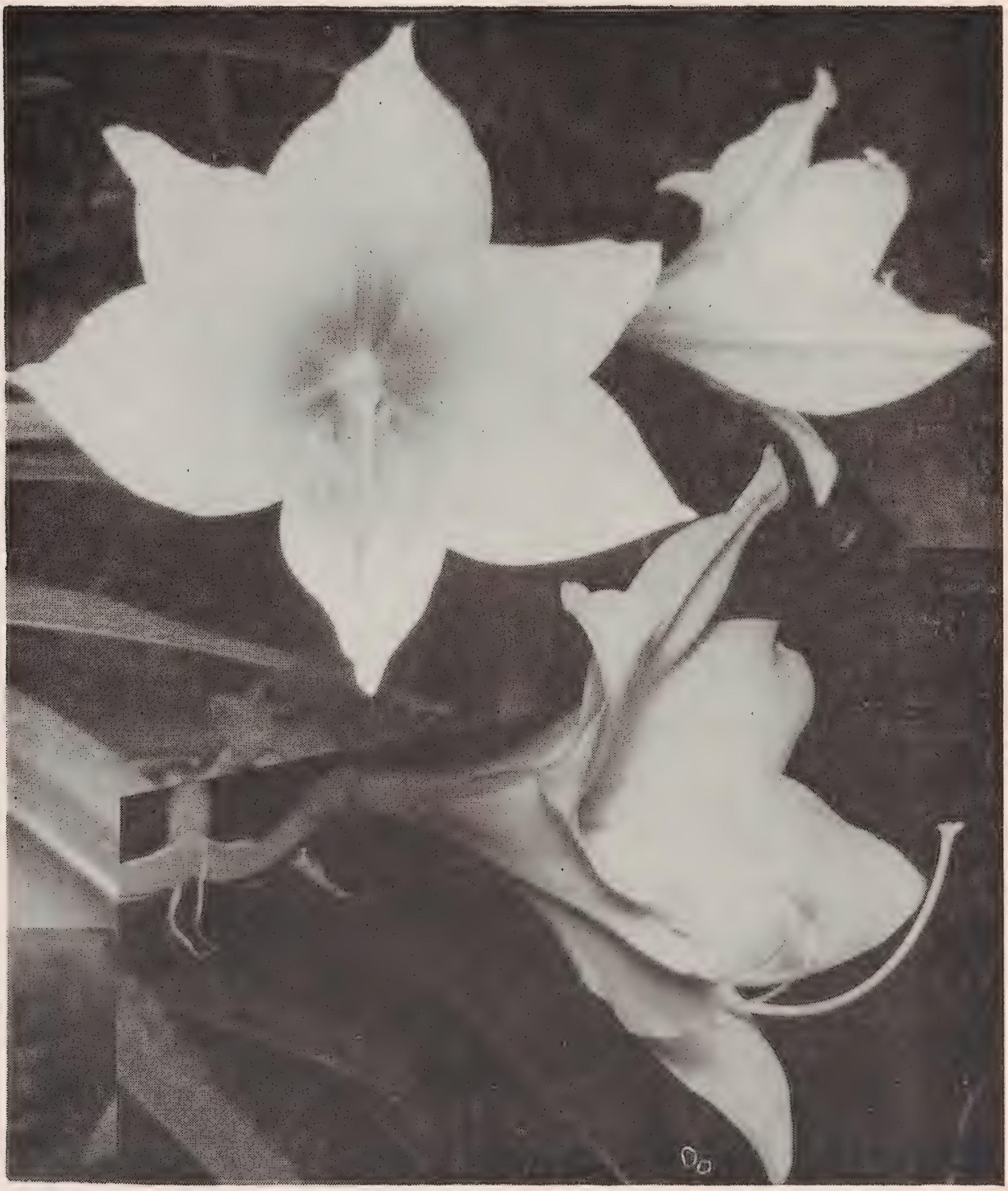

Fig. 11. Front & side view of Buck's beautiful orchid-flowered hybrid **Amaryllis**; a cross between 'Peg Dabagh' and **A. calyptrata.** Photo by Jack V. McCaskill

lilies from Texas'' were and how well they grew. So like the legend of the Yellow Rose of Texas, they have traveled far and wide in the hearts and gardens of many Texas relatives and neighbors, growing along the by-paths like the trees of Johnny Apple-Seed of long ago.

I have grown them in their present environment sixteen years along a winding sidewalk. The mother clone producing many offsets, I have shared offsets and thus their beauty with so many others, and also have found them very desirable in flower arrangements.

Fig. 12(1) *A. vittata* L'Hérit., showing 3 plants; one clone showing one scape past its prime, the second plant showing 2 scapes and the third plant with one scape growing among pansies.

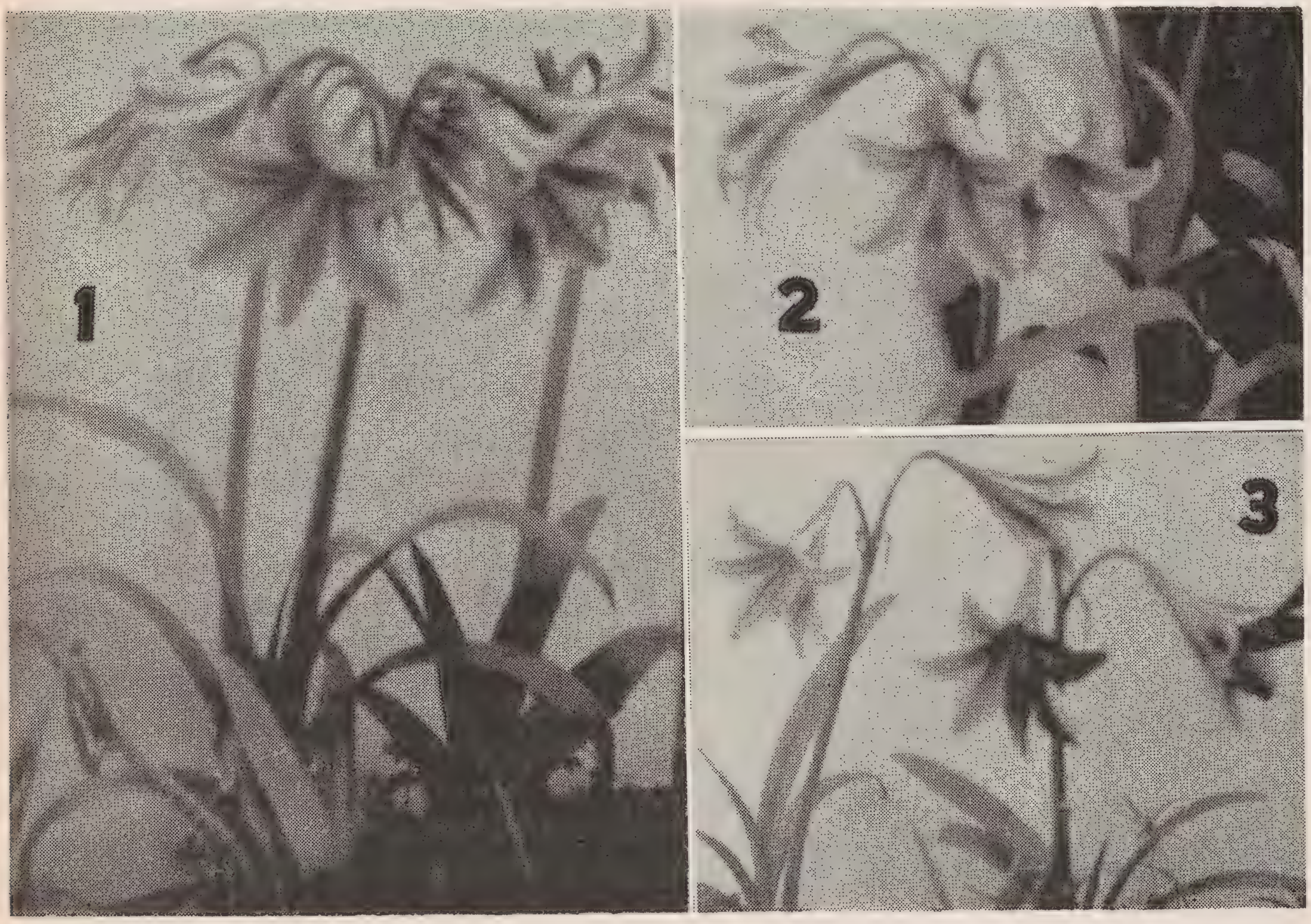

Fig. 12. **Amaryllis vittata** re-discovered by Mrs. Robt. E. Herold, San Antonio, Texas. (1) three plants in flower; (2) Another plant; and (3) plant showing somatic color mutations.

Fig. 12(2) *A. vittata* L'Hérit, across the sidewalk between phlox subulata and bearded Iris. In background, may be seen vittata hybrids in planter box.

Fig. 12(3) Shows *A. vittata* L'Hérit., with one floret showing mutation of two segs to red, one, half red and half white and three segs normally striped mauve-red.

I have another clone that is typical but with only ½ of one seg red and the other five and half striped normally.

The original soil composition was ''black gumbo'' enriched with sand, leaf mold and barnyard fertilizers. They were grown over the years in full sunshine. They are fed an organic base fertilizer (35%

manure) 5-10-5 (Wonder-Gro) used as a top dressing. Soil is alkaline, but fertilizer is acid in reaction, containing both organic and inorganic nutrients, thereby providing food over a longer period of time.

# CRINUM BRASILENSE SP. NOV.

HAMILTON P. TRAUB

In 1963, Dr. Cesar Vargas made a collecting trip for Mr. Robert D. Goedert. One of the items sent back by Dr. Varges was a *Crinum* sp. (Goedert SA63-11) which he had collected near Itajai, Brasil, ''at Flor de Santa Antonio, alt. sea level, in half shade, large, pure white flowers in spring.'' Some of the stock was sent on to the writer for identification, and the plants flowered at La Jolla, California, in his garden, June 20, 1965. This is a very unusual *Crinum* species with obovate-triangular leaves rather short in a sub-rosette. The flowers are a beautiful pure white, excepting that the tepaltube is greenish-yellowish to yellowish, and the tepalsegs are banded pale yellowish on the outside. A search showed that such a species had apparently not been recorded, and it has been named for the great United States of Brasil.

### **Crinum brasilense** Traub, **sp. nov.**

Foliis monnullis obovato-triangularibus subcaespitosis; scapo 23 cm. longo; valvis spathae 2 viridibus lanceolatis; umbella 6-flora; tubo tepalorum flavida-subviridibus 12.5 cm. longis; segmentis tepalorum albis 10.7—11.2 cm. longis 2.7—3.3 cm. latis; staminibus segmentis tepalorum ¼ brevioribus; stylo segmentis tepalorum paullo breviori; stigmate capitato.

The *bulbs* are deeply seated in the soil; *leaves* several, up to 27.5 cm. long; up to 8.5 cm. wide, obovate-triangular, dull green, the larger leaves with undulated margin to 2.5 cm. inwards, arranged in a sub-rosette, the older leaves prostrate, the younger horizontal to somewhat upright; winter deciduous; *scape* up to 23 cm. tall, 1—1.7 cm. in diam. at the base, 0.9—1.6 cm. in diam. at the apex, light green, compressed, with roundish edges; *spathe-valves* 2, green, 9.3—9.8 cm. long, lanceolate, apex rounded or acute; *umbel* 6-flowered, the flowers pure white, except the tepaltube greenish-yellowish to yellowish, tepalsegs banded pale yellowish on the outside; style pale yellowish below, greenish in upper ¼; fragrant; *ovary* sessile, 1.8 cm. long, 1.1 cm. in diam, green, subglobose; tepaltube 12.5 cm. long, 6 mm. in diam., greenish-yellowish in lower 1/3, pale yellowish above, slightly declined in upper part before opening; *setepalsegs* 11.2 cm. long, 2.7 cm. wide, lanceolate, acute; *petepalsegs* 10.7 cm. long, 3.3 cm. wide, oblanceolate, bluntly acute; *stamens* about ¾ as long as the tepalsegs; *style* slightly shorter than the tepalsegs, filiform; *stigma* capitate.

Holotype (nomenifer): No. 993a+b (TRA), flowered at La Jolla, Calif., from bulbs (Goedert SA63-11) collected by Dr. Vargas in Brasil, and shipped to Mr. Robt. D. Goedert, Jacksonville, Fla., in 1963.

# THE LIGHT PRIMROSE YELLOW CRINUM LUTEOLUM

Hamilton P. Traub

Until recently no yellow-flowering *Crinum* species was on record, but this has now been changed with the naming of the light primrose yellow flowering species, *Crinum luteolum* Traub & Hannibal (see Plant Life 21: 96. 1965).

The material was obtained by Mr. William Morris, formerly of Warners Bay, New South Wales, but now of Cairns, Queensland. The members are indebted Mr. Morris for his enthusiasm about the amaryllids and for his introduction of this new *Crinum,* and also for other native Australian amaryllids, including in addition to *Crinum luteolum, flaccidum, angustifolium,* and various species of *Calostemma.* In his new home State, he will be able to collect other amaryllids, including species of *Crinum, Eurycles* and *Calostemma.*

*Crinum luteolum* was pictured in Plant Life 19: fig. 12. 1963, before it was named in the following year. The forms of *Crinum luteolum* introduced earlier had relatively smaller flowers than most forms of *Crinum flaccidum.* However, in 1965, a form of *Crinum luteolum* with larger flowers bloomed under cultivation at La Jolla, Calif. This form is taken into consideration in the preparation of the amplified description presented here. *Crinum luteolum* is related to *C. flaccidum,* but differs significantly from it. In *C. luteolum* the leaves are evergreen, larger, and the entire leaf withers with maturity; in its native habitat it flowers usually in late winter to spring; the flowers are light primrose yellow, with relatively heavier substance; the lower three stamens are shorter and grouped together, the upper three somewhat wider apart. There are other differences.

### **Crinum luteolum** Traub & Hannibal, **descr. emend.**

Plant Life 21: 96. 1965.

A. C. flaccido recedit foliis amplioribus longioribusque sempervirentibus in statu senectute omnino intermortuis; floribus crassiusculis in patria indigena tempo hiemali vernalique florentibus claro-primulino-flavis; et caeteris.

*Bulb* deeply seated in the soil, very large ovate, 7.5 cm. long or longer, 5.9—6.5 cm. in diam. or thicker, bulb-neck 15 cm. long or longer, 1.4—2.4 cm. in diam.; bulb-coats whitish, longitudinal veins brownish; aerial pseudo-neck above the ground, about 5 cm. long. *Leaves* evergreen, up to 10, or more, widely U-shaped in cross section, relatively long, arcuate for part of their length, the remainder resting on the ground, 120—126 cm. long or longer, 3.6—4 cm. wide or wider, narrowing to a point in new leaves, dying in upper portions with age; grass green, of medium heavy substance, margin hyaline and scaberous; entire leaf dying on senescence. *Scape* solid, flattish with rounded edges, very light yellowish-greenish, changing to slightly reddish near base, 38—40 cm. long, 1.1 x 1.9 to 1.4 x 2.1 cm. in diam. at the base, 0.9 x 1.4 to 1.1 x 1.7 cm. in diam. at the apex. *Spathe-valves* 2, lanceolate, acute or bluntly acute, 7.2—8.3—12.5—13 cm. long, up to 2.6 cm. wide at the base, very light yellowish, finally changing to amberish or whitish, at first upright, later drooping. Umbel 6—14-flowered, flowers wide open, slightly declined at anthesis, light primrose yellow (HCC 601/1 to 601/2); odor not particularly pleasant. *Pedicels* green, 3.3—4.4—5 cm. long at anthesis. *Ovary* green, 1.2—1.8 cm. long, 4—6—7 mm. in diam. *Perigone* only slightly but definitely zygomorphic, tepalsegs not widely expanded; the lower 3 stamens fairly close together, the 3 upper farther apart. *Tepaltube* slightly curved, 3.4—4.5 cm. long, 4—5.5 mm. in diam. *Tepalsegs* of relatively thick texture, lanceolate, acute, to oblanceolate. *Setepalsegs* 4.6—8.5—9 cm. long, 1.8—2.3 cm. wide; *petepalsegs* 4.6—8.2—8.7 cm. long, 2—2.5 cm. wide. The three *stamen filaments* opposite the three petepalsegs slightly adnate to these at the base, the lower 3 somewhat close together, the upper 3 farther apart, 3.3 cm. long; anthers at anthesis 1.2 cm. long, becoming arcuate with age; versatile, introrse; pollen yellow. *Style* 1.1 cm. longer than the stamens, shorter than the tepalsegs; *stigma* minute, faintly pinkish.

Holotype (nomenifer): No. 985 (TRA), flowered at La Jolla, Calif., from a bulb collected at Pichi-Richi Pass, Flinders Range, near Port Augusta, South Australia, and sent to the United States by William Morris. No. 999 (TRA), from the same source.

*Crinum luteolum* is self-fertile to a limited extent and thus can be propagated from seeds, and in this way can be widely distributed in the United States. Since the plant is found in a cool location, and the bulbs are very deeply seated in the ground, it should be possible to cultivate this species as far north outdoors as middle eastern states, and even farther north on the south side of buildings with mulching protection.

## NEAR WHITE DOUBLE HYBRID AMARYLLIS

W. R. Latapie, *3737 Elysian Fields,*
*New Orleans, Louisiana 70122*

The writer and his wife, Hilda S. Latapie, have been breeding hybrid *Amaryllis* since 1940, and one of our main objectives has been to produce white double clones. This ideal has almost been reached with the appearance of a near-white double clone (Fig. 13). This is apparently the first one of its kind in existence.

It is interesting to note that in the seed batch from which this hybrid was selected, we also obtained several other different doubles, but the "McCann" coloring predominated. These were true doubles, triples, having eighteen to twenty-one tepalsegs in each flower. In this batch also some single red and white flowering hybrids were obtained.

The double hybrid flowered for the first time during the season of 1965 when the following detailed description was made:

Length of scape: 14 inches high; number of buds: three, each blooming separately; number of petals: 21; length of flower 2½ inches; length of pedicel: 2 inches; length of tepaltube; ½ inch; perigone width: 6 inches across; perigone 5 inches from top to bottom; color: white with cherry red faint streak each side of mid-rib, inner throat green; tepalsegs (size) four outer segs (setepalsegs): 2 inches wide, graduating to ¾ inches in center; three anthers with no pollen; no visible pistil; size of bulb: 8 inches in circumeference; flower has fragrance.

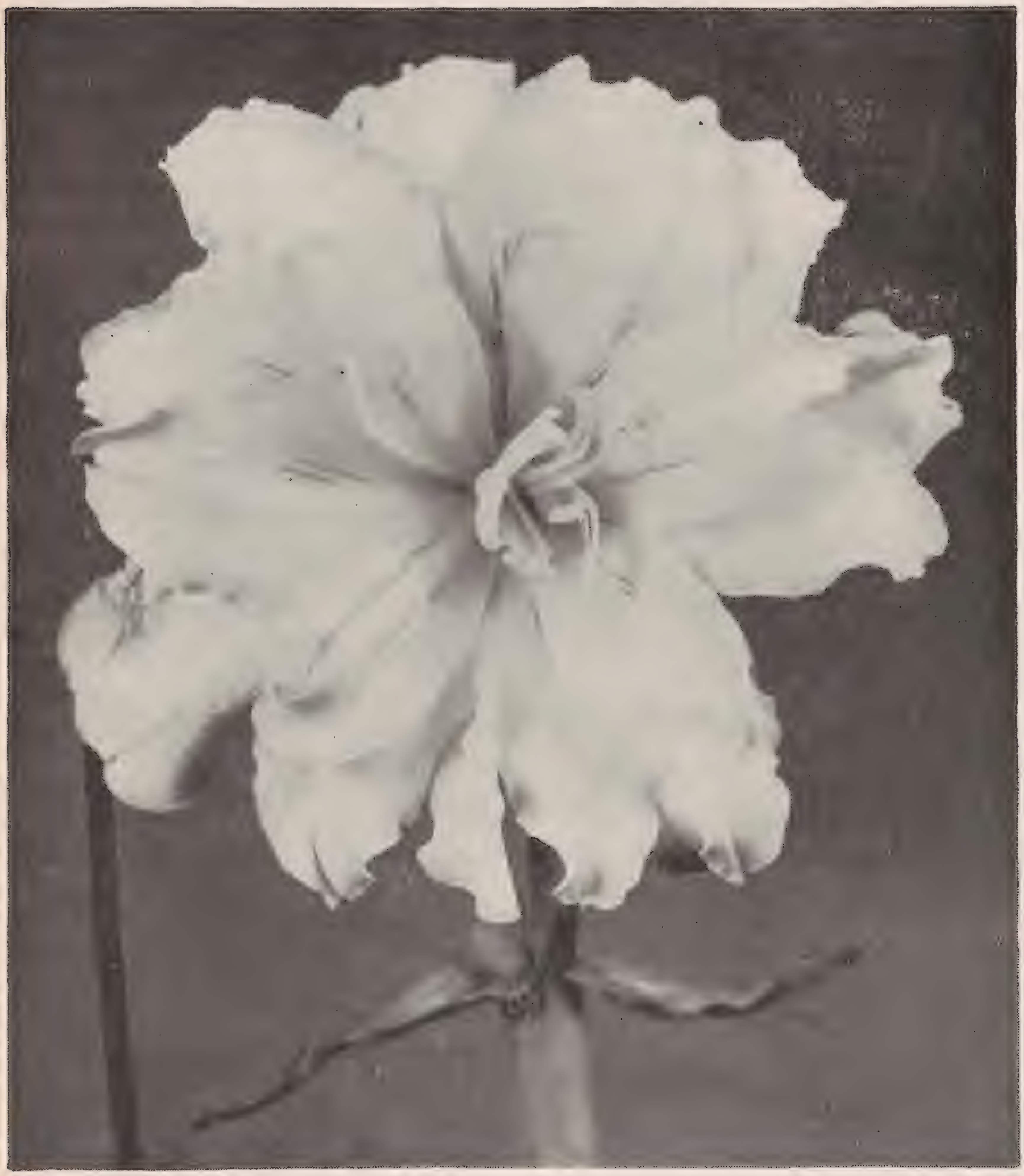

Fig. 13. Beautiful double near white hybrid **Amaryllis** produced by Walter and Hilda Latapie, of New Orleans, La.

Leaves 1½ inches wide; neck of bulb is short.

The hybrid is a cross of 'Captain McCann' red (double) x "Maria Goretti" (White).

# POLYEMBRYONY IN HYMENOCALLIS MEXICANA

HAMILTON P. TRAUB

It is the usual practice to collect amaryllid seeds and store them in open dishes in the garage so to have them handy for distribution. Among the seeds exposed in this manner this season were those of *Hymenocallis mexicana* which blooms in late spring or early summer. The seeds soon burst the capsule walls and are exposed; and later fall to the ground. Seeds collected in early summer were stored in open dishes and produced sprouts which formed tiny bulblets at the end of the sprout as is usual with most amaryllids. On examination recently (9-26-65), it was noted that one seed had two such sprouts each with a tiny bulblet. This was unusual and had not been noted before in amaryllids. On further examination, the dish contained two additional seeds with two sprouts. Thus the original observation had been verified, and records were made. In the case of two seeds the sprouts were at opposite ends of the seed; in one, two sprouts were on the same end. Dissection of the seeds showed that each of the three seeds contained two embryos. This is the first case of polyembryony in amaryllids observed by the writer. Perhaps others have made similar observations. If this is so reports in Plant Life are welcomed.

# THE TYPE OF LYCORIS AUREA HERB. 1821

HAMILTON P. TRAUB

Herbert based his genus *Lycoris* Herb. (App. 20, 1821) on *Lycoris aurea* (L'Herit.) Herb., (Bot. Mag. Lond. 409. 1789; *Amaryllis aurea* L'Herit.). syn.—*Amaryllis aurea* L'Herit., Sert. Angl. 14, pl. 15. 1784; with descriptions in Hort. Kew 1:. 419. 1789; and Miller's Dict. ed. Mart.

Herbert in the Appendix, 1821, remarks that the flowers are pale orange, having narrow and somewhat undulated segments, with a greenish keel; style very long, stigma bright red. An examination of the plate 409 in Botanical Magazine shows that the tepalsegs are narrow, long elliptic-lanceolate, the spathe valves lanceolate, rather long. Thus, it is certain that the plant at present recognized as *Lycoris aurea* is correctly identified. The reader should refer to Plate 313, *Lycoris aurea*, in Herbertia 14: 183. 1947 (1948). For the distinction between *Lycoris aurea* and *L. traubii* Hayward, the reader should refer to Hayward's article in PLANT LIFE 13: 40—42, fig. 13, 1957.

# CRINUM CLONE 'CECIL HOUDYSHEL'

L. S. Hannibal, *Fair Oaks, Calif.*

According to Herbertia, Volume 2, page 111, *Crinum* x *powellii* 'Cecil Houdyshel' is apparently a *C. Bulbispermum roseum* x *C. moorei* cross. Crosses made by Major Pam and the writer using *C. b. roseum* have never duplicated the Cecil Houdyshel cross, and it was not until some *Crinodonna* hybrids and *C. americanum* hybrids were flowered where *C.* 'Cecil Houdyshel' was the pollen parent that we began to wonder just what was involved in the parentage of *C.* 'Cecil Houdyshel'. The reason for this reaction is that these secondary hybrids are either pure white or as deep a red as in several *Scabrum* crosses. Normally we would expect a dilution of the color gene, but this vividness appears to exceed anything which might come out of *C. bulbispermum roseum.*

At the moment we are wondering if Mr. Cecil Houdyshel used a *scabrum* x *moorei* pollen hybrid on *C. bulbispermum album.* This would explain the vivid color of *C.* 'Cecil Houdyshel' and the breeding behavior of the seedlings where it is a pollen parent.

As most *Crinum* fanciers know *C.* 'Cecil Houdyshel' selfs with considerable difficulty and the seedlings are weak, but it will often take other pollens such as those of *powelli album* or that of various species such as *C. bulbispermum album.* The writer's white-flowered *Crinodonna* is one of the most free flowering forms so far encountered and the form is very good. The tentative name is 'Grace'.

# 1965 DAYLILY REPORT

W. Quinn Buck, *Chairman, Daylily Committee*

Greater interest in pinks and the lavenders and blues, and a better acceptance of the tetraploid daylilies as a real horticultural advancement may be said to characterize the year 1965. A few notes are given here in the hope of reflecting these developments:

One of the brightest of the new diploid pinks in my garden was 'Zadol' (Spalding), the color having a glow unmarred by any admixture of salmon; one had to marvel each morning at the freshness of its color. Of even better shape was 'Pink Fluff' (Spalding), which had a blended color tone. 'Edna Spalding', named for its originator, was an outstandingly beautiful pale pink of exquisite texture, and now an induced tetraploid form of this clone is reported as being even finer. 'Pink Superior' (Fay) also was a really fine pale pink and it repeated vigorously. This reblooming characteristic, one of Mr. Fay's important goals, was displayed by a small summer-planted division of 'Pink Venus', which was sending up a second spike before the first was finished; it is hoped that the color quality will improve as this clone becomes better established. The clear color of the lavender-pink bi-tone 'Grace Lenington' (Lenington) was refreshing on a small new plant.

Other large pinks that made a good show were 'Peach Petal' (Lester), 'Almond Pink' (Hardy), and 'Exotic Lady' (Childs); the latter repeated strongly and beautifully. The florid pink blend 'Buddy' (Claar) was adversely affected by nights too cool for it; the real beauty of 'Annie Welch' (Claar) was not apparent until our warmest nights had come, and then it was a marvel in spite of its somewhat sprawling scapes.

For real lavender color 1965 honors must go to 'Lavender Flight' (Spalding), which was a larger and better finished flower than most clones in its class. For clean bluish color we must admire 'Lavender Touch' (Childs), but it did not rival the earlier brightness of 'Blue Jay' (Spalding), which continues to be one of the fine clones. The Kennedy 55-54C had no peer for blue-purple color. A new seedling 65D1 (Buck) was a real joy in its deep rose-magenta self color, which promises much for the breeding of lavenders. 'Wannetta' (Spalding) was a delightful miniature of bright lavender-purple that was most outstanding in color quality.

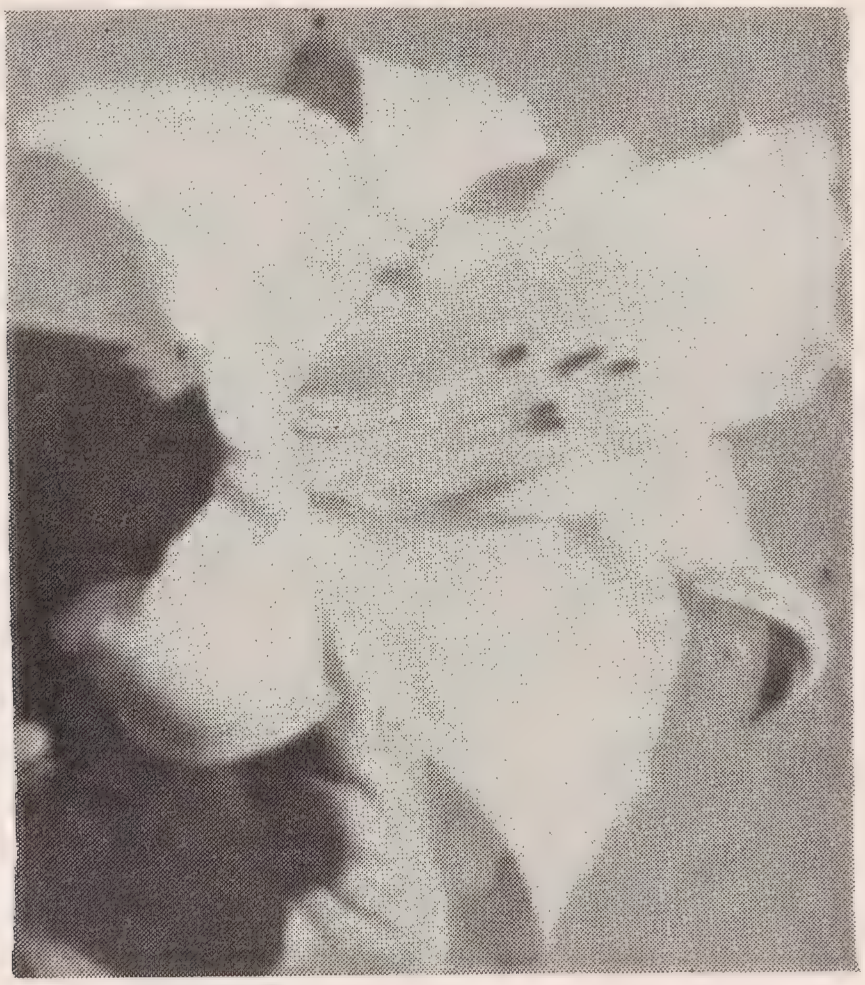

Fig. 14. **Hemerocallis washingtonia** clone 'California Duchess', brighter barium yellow.

'Emperor's Robe' (Fay) was a huge flower, very fine, but in my inland California garden it was certainly more pink than lavender. Likewise, 'Ruffled Star' (Fay) had little of the lavender in its blended color; it and 'Breaking Dawn' (Fay) were very large and quite outstanding pink blends.

Among the melons 'Louise Simon' (MacMillan) was again unchallenged among the early ones—if at all. 'Mildred O'Neal' (Kraus) was a most beautiful new melon with rounded form, and 'Hopewell' (Kraus) had a deep apricot melon flower with great substance. 'Far East' (Fay) proved to be a vigorous, reblooming large orange melon of superior bright quality. The new 'Christine Ann' (Fay) was a lovely firm-textured melon among the very late ones.

'Ruffled Wax' (Fay) was well named, having unparalleled substance among the new yellows; it was lacking in distinction of form, however. Beautiful form and ruffling and ample substance characterized the flowers on the wonderfully branched spikes of 'Carl Milliken' (Hager), which rebloomed vigorously and was in every way a worthy tribute to the late hybridizer.

Among the tetraploids it is difficult to single out any individual clones for mention because few reports have been received. From E. W. Brown III of Orange, Texas, comes word of two outstanding seedlings out of the Crestwood lines: TS-6-65P is a beautiful eyed, clear pink in his Kodachrome of it, and T-6-65R is a handsome green-throated, eyed rose. Dr. Virginia Peck has a most outstandingly fine melon in her induced T-1-65, which is incredibly round and ruffled.

One of the fine textured tetraploids is 'California Duchess' (Traub) which is a subtle barium yellow in color and perfectly rain and sunproof; and is recurrent blooming. (Fig. 14)

The many visitors who saw the Fay-Griesbach tetraploids in 1964 have had much to do with the more favorable acceptance that begins to be evidenced in 1965. Still more visitors saw this planting in 1965, but the reports are that the seedling tetraploids, mainly of the Crestwood line, in the Mission Gardens fields in Techny, Ill., were the real eye-openers for the many visitors who went to see Brother Charles's work.—*26 E. Camino Real, Arcadia, Calif.*

# THE CHROMOSOMES OF RAUHIA PERUVIANA TRAUB

Walter S. Flory,

*Wake Forest College*

The genus *Rauhia,* and its single known species *R. peruviana,* were both described by H. P. Traub in 1957. Dr. Traub has sent the writer a bulb of Clone A, and also a bulb of Clone B of this species for cytological study. The present article deals chiefly with the chromosomes of Clone B of *R. peruviana.*

The somatic chromosome number of this species is 46, this number having been seen clearly in eight different metaphase divisions of root tips from the single small bulb available. All divisions exhibited essentially the same chromosome types. Figure 15 shows one of these divisions from a root tip treated in .2 per cent colchicine for 5 hours, followed by alcohol: acetic acid, 3:1, fixation overnight and squashing in aceto-orecin solution. The drawing was made with a camera-lucida at a table magnification of approximately X2500.

When root tips are pretreated in colchicine for several hours the chromosomes are considerably contracted. Also, following this treatment, the chromatids of the divided metaphase chromosomes remain loosely together for some time after they normally would have separated. This condition was quite apparent in our preparations, and is apparent in the accompanying drawing (Fig. 15).

### THE CHROMOSOMES OF CLONE B

Four types of chromosomes occur in our bulb of Clone B. These types, with the number of each type, sizes of each type following the colchicine treatment, and the size range of each type, will be briefly described.

There are three long chromosomes with median, or near-median, centromeric constrictions, each approximately 11 microns in length. In each, one arm is slightly over 5 microns, one arm is slightly less than 5 microns, and the centromere constriction space is approximately one micron in length.

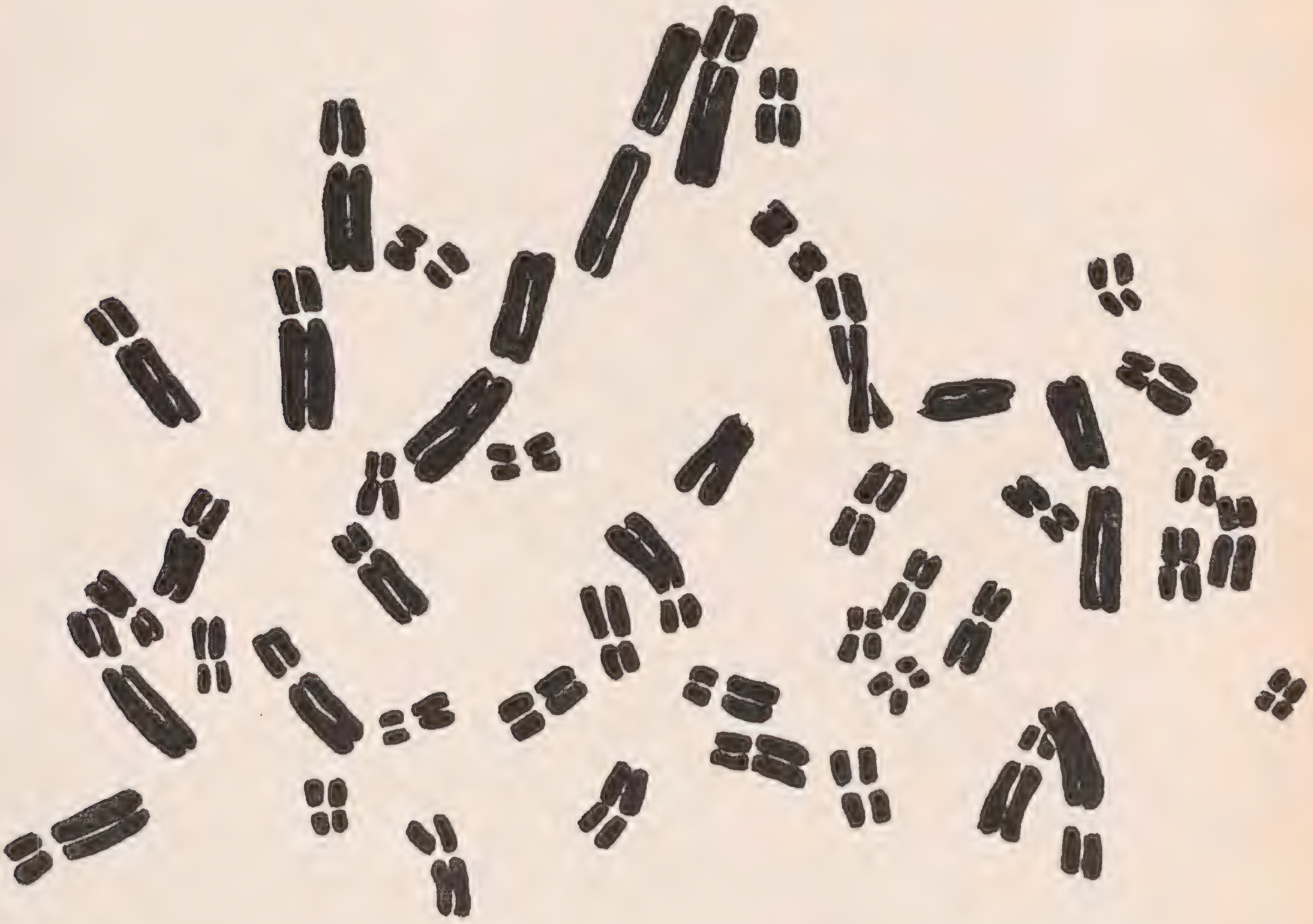

Fig. 15. Chromosomes of **Rauhia peruviana**, 2n = 46. Camera lucida drawing at X2500; reduced by about 15% in reproduction.

There are 19 shorter submedian chromosomes, with several of these approaching the subterminal condition, ranging from just a little over 7 microns to—in one pair—just under 4 microns in length. The long arms of these chromosomes are approximately twice the length of their short arms. In this group there are 5 chromosomes which are 7 microns, or just a little more, in length, there are two, as mentioned, which are slightly less than 4 microns long, four which are 4 microns long, with the remainder varying—in pairs—from more than 4 up to almost 7 microns in length.

The remaining two chromosomes comprise a fourth type since they are terminally constricted ones about 4 microns in length. This means they are approximately the same length as the shorter arms of the long, almost medianly constricted, chromosomes. Also, they are about the same length as the long arms of the longest chromosomes of the submedian group.

It has been pointed out that there are three long chromosomes with approximately median constrictions, and that there are five chromosomes each about 7 microns in length in the group with submedian attachment constrictions. The two terminal chromosomes appear to be the same length and would seem at first glance to be members of a pair. Considering the odd numbers of long median, and of long submedian, chromosomes—together with the similarity of length of short arm in the one, and of long arm in the other—it seems plausible that the two terminal chromosomes encountered here are actually the remnants of single fractured chromosomes of two different pairs. If such is true, the short arm of a long chromosome has been lost in one case, while the long arm of a shorter chromosome was also lost. If this is a true picture of events leading up to the presently observed and described karyotype, the observed karyotype would apparently have been derived from one in which only three types of chromosomes occurred. These types, with the numbers of each would be: (1) long median, or near-median, chromosomes—4; (2) short sub-median—20; and (3) short median, or near-median—22.

## THE CHROMOSOMES OF CLONE A

Soon after receipt of the two *Rauhia* bulbs, cytological squashes were made of root tips of the Clone A one. Original observations indicated that there were 48, or approximately 48, somatic chromosomes in this accession. The bulb was lost before additional studies could be made of Clone A material. It is possible that this Clone (1) does have two more chromosomes than Clone B; (2) that the original tentative counts were in error and that this Clone also has 46 somatic chromosomes; or (3) that some other situation exists in Clone A.

If additional material becomes available the chromosome set-up in this Clone will be studied further.

## BASIC CHROMOSOME NUMBER

Traub (1957) originally placed *Rauhia* in Tribe Pancratieae, along with *Chlidanthus, Pancratium* and *Stenomesson.* In a more recent treatment (Traub, 1963) he places *Rauhia* in his Tribe Stenomesseae, with *Chlidanthus, Pamianthe, Paramongaia* and *Stenomesson.*

Chromosome numbers are found in the literature for only two species in Tribe Stenomesseae. La Cour (1956) reported *Pamianthe peruviana* to have $2n=46$, while Mookerjea (1955) found 2n to be 20 in *Chlidanthus fragrans.*

A number of years ago the present writer found *Stenomesson variegatum* to have 70 ± somatic chromosomes. The possibility exists that in this species 2n may be 69, or a number derived from 69.

It thus appears that 23 is a base number in the genera *Rauhia, Pamianthe,* and possibly *Stenomesson,* of Tribe Stenomesseae. Just how *Chlidanthus fragrans,* with 2n=20, relates cytologically to the three genera just mentioned appears problematical, as yet.

It seems of interest that considerable unpublished data on the chromosomes of *Hymenocallis,* of the closely related Tribe Euchareae, points to 23 as being an important base number in this genus.

## SUMMARY

*Rauhia peruviana* (Clone B, from H. P. Traub) has 46 somatic chromosomes in the single bulb studied. These may be classified as: long, median constrictions—3; shorter, submedian—19; short, median—22; terminal constrictions—2. One of the chromosomes with terminal constriction may be the short arm of an originally long, median chromosome; while the similar element may be the long arm of a shorter, originally submedian chromosome. The base number appears to be 23.

## REFERENCES

La Cour, L. F. 1956. Unpublished. In Darlington's "Chromosome Atlas of Flowering Plants," p. 383.

Mookerjea, A. 1955. Caryologia 7:1.

Traub, H. P. 1957. Plant Life 13:73.

————————. 1963. Genera of Amaryllidaceae. pp. 19, 71.

# NERINE UNDULATA

L. S. Hannibal, *4008 Villa Ct., Fair Oaks, Calif.*

Some years ago the writer received some very small hardy *Nerine* bulbs from Harrison's in New Zealand with the suggestion that they be properly identified. The foliage resembled that of *N. sarniensis* only it was only about six mm. wide and equally dwarf in other proportions. The scapes were about 15 inches high and 3 or 4 mm in diameter, and the blossoms were mere spidery filaments with the tepals some 3.5 to 4 cm. long by 1½ to 2 mm. wide and rather well crisped. Some similarities to *Bowdenni* were noted, especially in seeding habits. It was found that the two would readily cross, despite the great difference in size. The resulting hybrids are both summer and winter growing and are as hardy as *N. bowdenii* or *N. humilis.*

Eventually through the cooperation of Dr. J. W. van der Walt bulbs were submitted to Bolus Herbarium and Miss Verdoorn has confirmed that these are definitely *N. undulata* (see Fig. 16). As a result we can report that *N. undulata, N. flexuosa* and *N. bowdenii* belong to the same alliance as it appears that all of their crosses are fairly vigorous and quite fertile. As a garden flower *N. undulata* is entirely too whispy to indicate its presence.

# CRINUM CLONE 'GULF PRIDE'

L. S. HANNIBAL, *4008 Villa Court,*
*Fair Oaks, Calif.*

A year or so back Dr. Thaddus Howard sent the writer a *Crinum* bulb labeled *C. Kunthianum* which was described as having rather fragrant waxy-like blossoms that tended to droop in warm weather. When the plant flowered here it was obviously not *C. Kunthianum* Roem., as the latter has long rayed tepalsegs which places the plant in the class with *C. americanum,* except that *C. Kunthianum* blossoms are generally colored a wine pink.

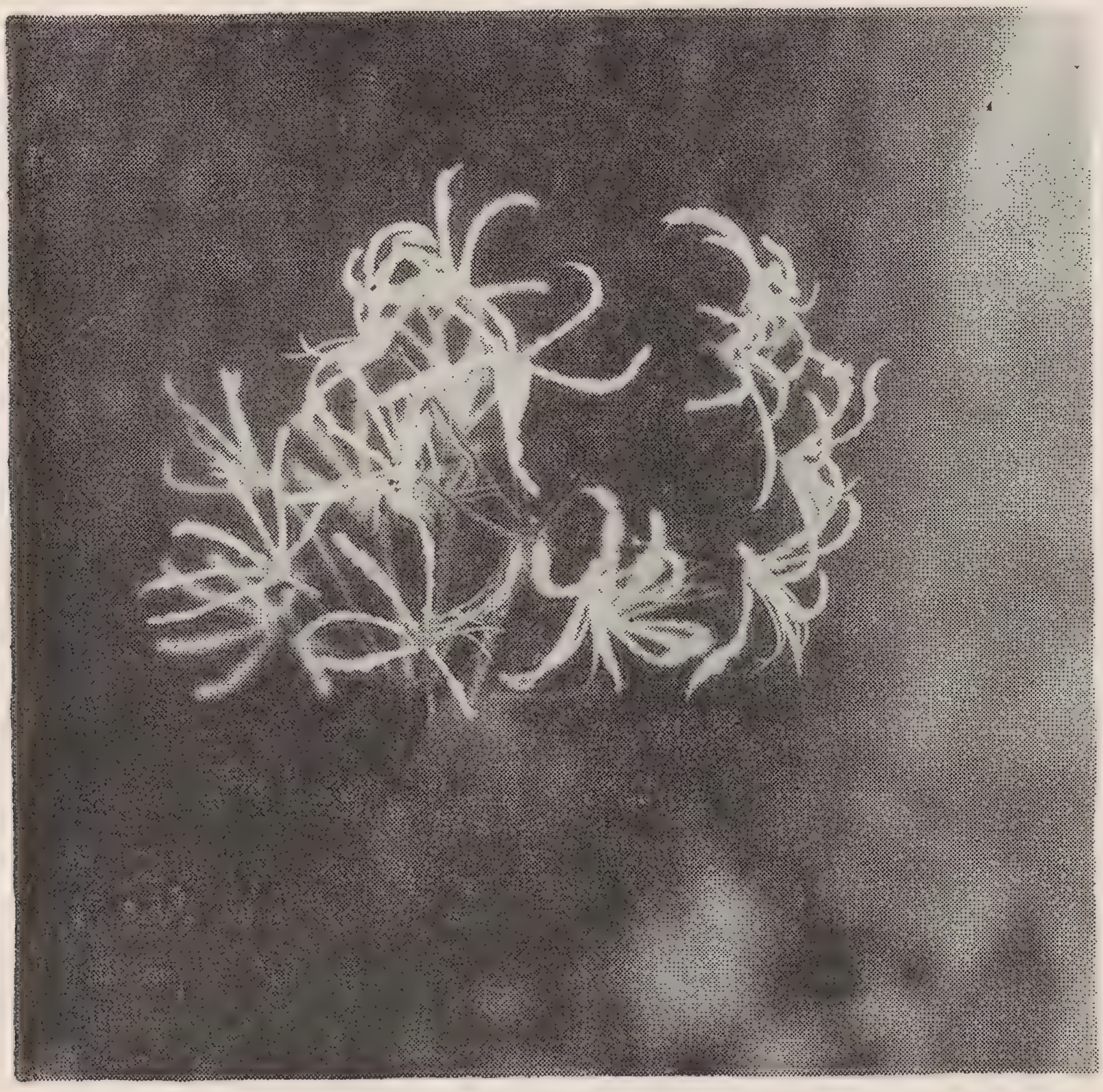

Fig. 16. **Nerine undulata,** grown by L. S. Hannibal, Fair Oaks, Calif.

In searching the literature I came across a hybrid listed by L. H. Bailey in the Cyclopedia of Horticulture as *C. Kunthianum* Hort. non Roem., which is given as a cross of *C. Bulbispermum* and *C. Scabrum.* Since the original bulb had come from Lakemont Gardens I am rather inclined to believe that Dr. Howard's contribution was this same clone that Bailey describes. In comparing the plant to several other *C. Bulbispermum* hybrids it is rather obvious from the foliage that it is a *Bulbi* termin if the other parent was *C. Scabrum* or *C. Kirkii.* The trumpet shaped blossoms are a waxy pink-white with the general concentration of the pink pigment along the keel of the tepalsegs. Such a waxy texture and coloring could be derived from either of the latter species. The plant has been reportedly sterile as it sets no seed but we have found

CRINUM CLONE 'GULF PRIDE'—continued on page 70.

# CRINUM FLACCIDUM CLONE 'WILLIAM MORRIS'

HAMILTON P. TRAUB

Mr. William Morris of Cairns, Queensland, Australia, has sent to us many bulbs of *Crinum flaccidum* which is a very variable species. The tepalsegs of the flowers in most of the plants are narrowly ovate-acute, but in one clone, the tepalsegs are more broadly ovate. The setsegs are broadly-ovate, acute, and the petsegs are ovate, with apexes rounded, thus producing an imbricated effect (see Fig. 17). This outstanding plant was chosen from a large lot as the very finest for decorative purposes, and has been named 'William Morris' (Specimen No. 1000a+b

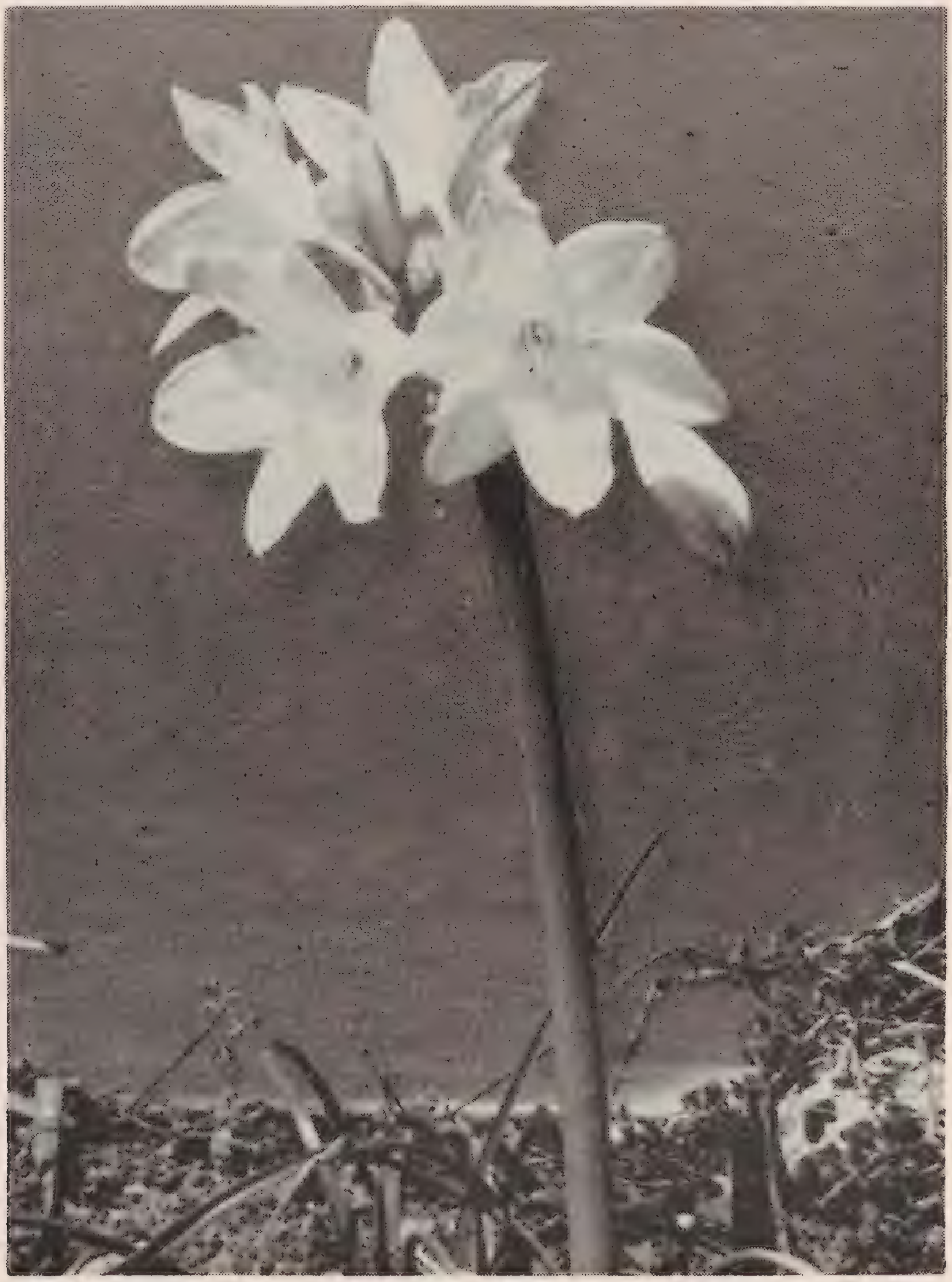

Fig. 17. **Crinum flaccidum** clone 'William Morris'; collected in the wild in Australia by William Morris, Cairns, Queensland.

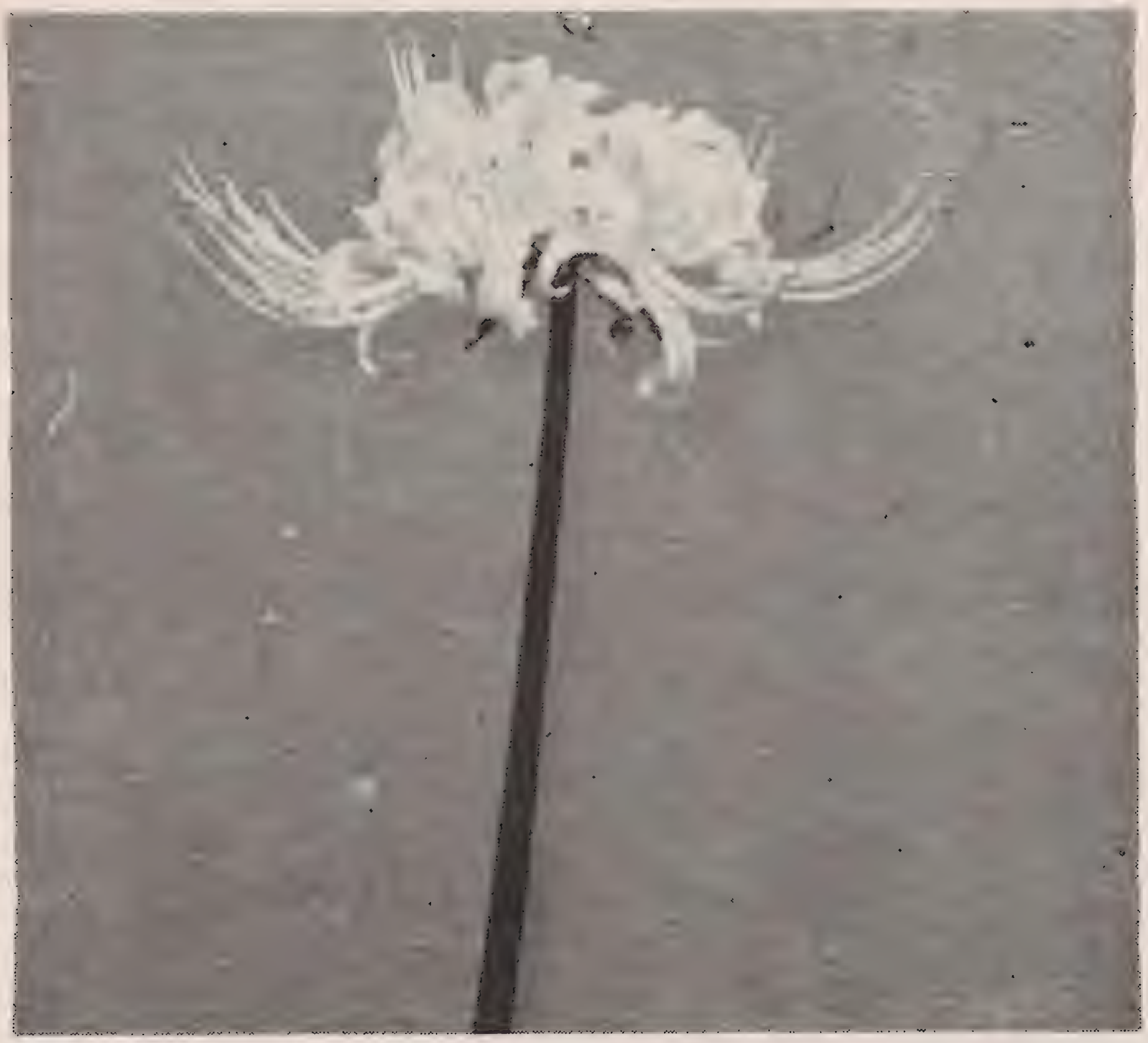

Fig. 18. **Lycoris albifora** (?) as flowered at La Jolla, Calif. in 1965.

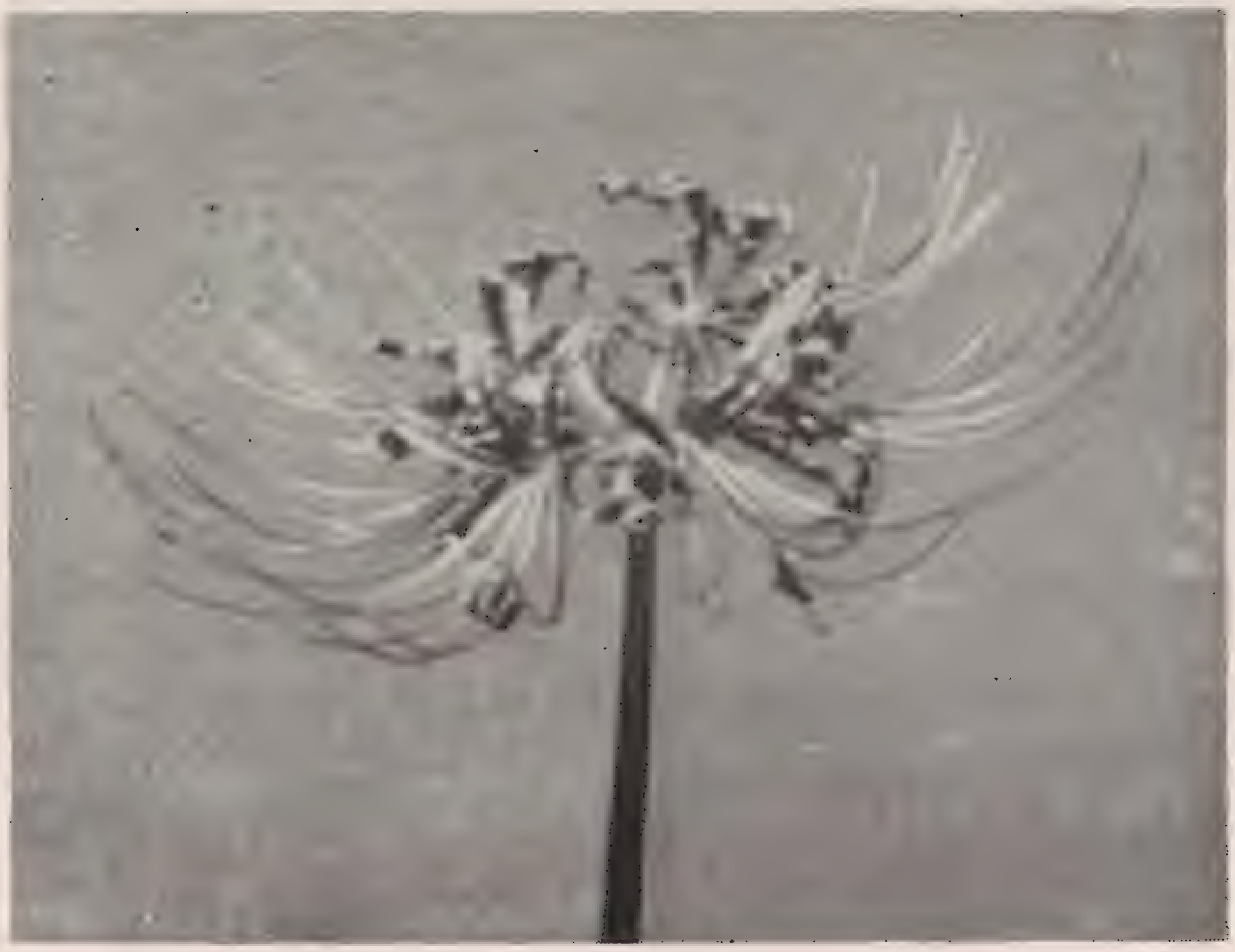

Fig. 19. **Lycoris josephinae** as flowered at La Jolla, Calif. in 1965.

(TRA), collected by Mr. Morris) for Mr. Morris of Australia who kindly sent a wealth of amaryllids to us. An attempt will be made to propagate this clone vegetatively.

## THREE LITTLE KNOWN LYCORIS

HAMILTON P. TRAUB

The purpose of the present brief note is to report on the blooming of three relatively little known *Lycoris* species, *L. alliflora* (?), *L. josephinae* and *L. koreana* (?). The writer used his Fotron camera in photographing the plants in flower.

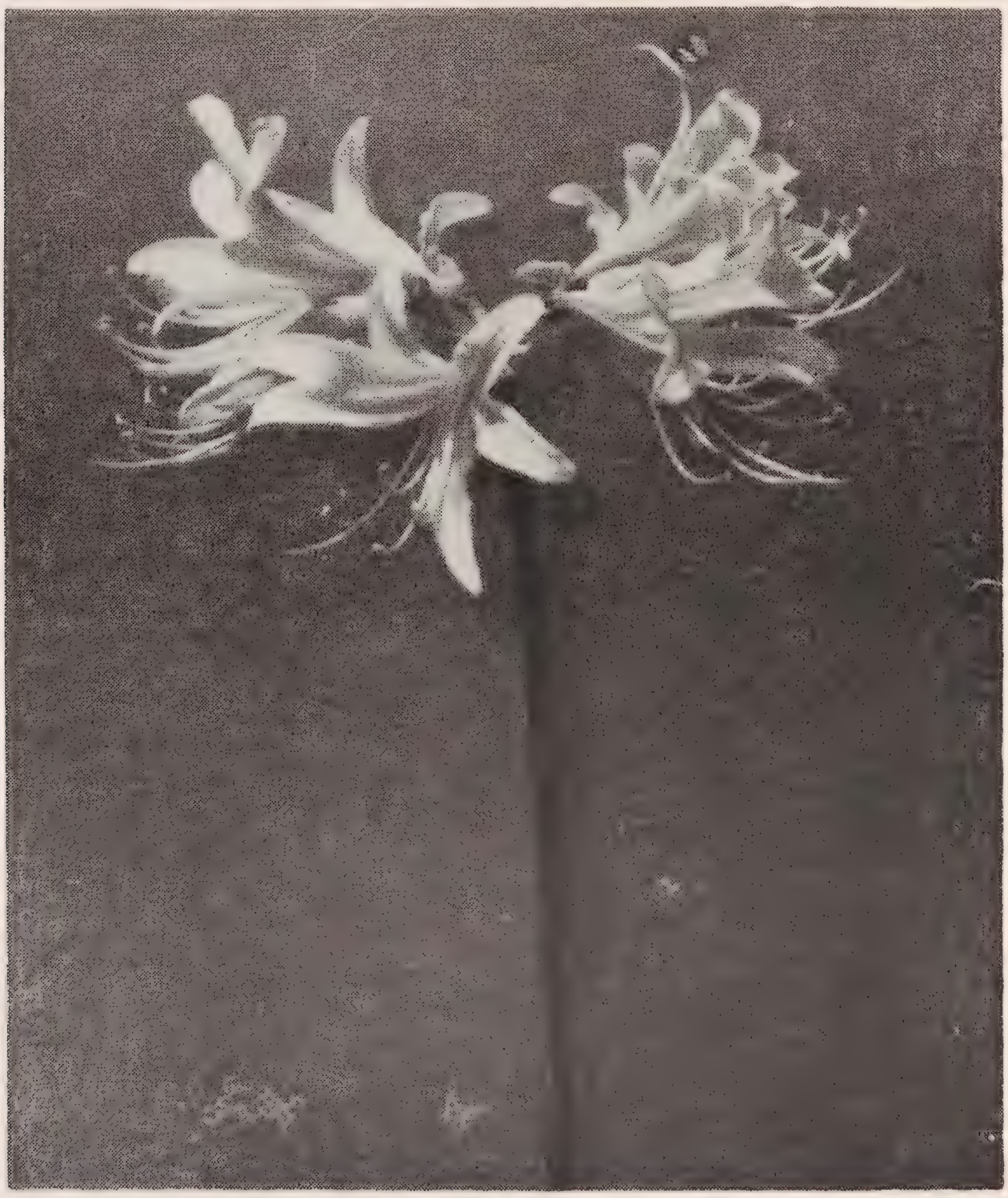

Fig. 20. Lycoris koreana (?) as flowered at La Jolla, Calif., in 1965.

### Lycoris albiflora (?)

In 1958, Mr. Sam Caldwell sent us a tiny bulblet labeled ''Lycoris albiflora''. This plant had continually declined at Nashville over a number of years. Apparently, the climate was not favorable for its growth there. The bulblet was set out in the garden at La Jolla, and it very gradually recovered over the years, and to our surprise, after seven years, it bloomed on August 28, 1965. It turned out to be a very beautiful species. The umbel was 7-flowered, and the flowers were assurgent (see Fig. 18), slightly pinkish in bud, opening creamy-white, very slightly tinged or streaked pinkish, maturing to solid creamy-white, with deeper creamy band in the center of the segs; the stamens and style were very slightly tinged pinkish (specimen #1012(TRA), 8-28-65). A comparison of the original description of Koidzumi (see Traub & Moldk, Amaryllidac.; Amaryll. 1949, p. 178), which is incomplete in some details, shows that it comes near to that species, and may actually be this species. However, it is not white, but creamy-white and apparently Koidzumi was careless in indicating the flower color.

### Lycoris josephinae

This species bloomed in 1964 and again in 1965. The bulbs were collected originally by Miss Josephine Henry in China as indicated in Plant Life 21: 63—64. 1965). It differs from the ordinary self-fertile *Lycoris radiata* var. *radiata* in having stouter scapes, and in blooming later (late August through mid-September), and in having Delft rose-colored flowers. The umbel is 8-flowered. See Fig. 19.

### Lycoris Koreana (?)

In 1964, Mr. Goedert sent us some bulbs labeled ''Lyoris Vermilion'' which he had imported from Japan. These were set out in the garden, and made good foliage during the winter. In late August 1965, flowers were obtained. See Fig. 20. A comparison of this plant (specimen #1011 (TRA), 8-28-65) with the description given by Nakai (see Traub & Moldk., Amaryllidac.: Tribe Amaryll. 1949, p. 176) shows that it comes near to that species. The flower color is a light brick-red (which the Japanese grower had almost correctly indicated as vermilion). The umbel is 7-flowered, the segs are quite regular, not twisted and crisped. Thus this may actually be *Lycoris koreana.* However, further comparisons will be made during the 1966 flowering season.

## FURTHER NOTES ON GETHYLLIS, KLINGIA APODOLIRION, HESSEA AND STRUMARIA

Roux Wilsenach, *Dept. of Botany, University of the Witwatersrand Johannesburg, South Africa*

In a recent paper (Wilsenach, 1965) chromosome numbers and idiograms were presented for *Gethyllis, Klingia, Apodolirion, Hessea* and *Strumaria.* As the cytology of these genera was previously unknown, it led to new ideas on the relationships and to a discussion in which the systems of Pax and Hoffmann (1930), Gouws (1949) and Hutchinson (1934) were criticized. Unfortunately ''The Genera of Amaryllidaceae''

(Traub, 1963) was not available to the author then and in these brief notes the results presented recently (Wilsenach, 1965) will be related to the grouping of genera according to Traub (1963).

In my recent paper the close relationship between *Hessea* (and *Strumaria*) and *Nerine* was demonstrated and this meant that these genera should be included in one tribe. Gouws' subtribe *Amaryllidinae* is identical to Traub's tribe *Crineae.* It is suggested that *Hessea* and *Strumaria* should be included here and this will create a big tribe which will include the following genera: *Hessea, Strumaria, Nerine, Brunsvigia, Boöphone, Ammacharis, Cybistetes, Crinum* and *Carpolyza* should tentatively also be included here. The basic chromosome number of this tribe will be n=11, but a few species have 12 as the haploid number.

Traub's suggestion that *Apodolirion* and *Gethyllis* may be congeneric is fully supported by the cytological data presented. *Klingia* was separated by Traub from these, being tentatively placed in the tribe *Pancratieae.* This decision by Traub must have been based on the presence of a staminal cup in *Klingia,* but as Traub pointed out more evidence was required. The idiograms of *Gethyllis, Klingia* and *Apodolirion* were so surprisingly similar that it was suggested to sink the three genera, recognising only *Gethyllis* (Wilsenach, 1965).

As far as I know it is still unknown whether the fruit of *Klingia namaquensis* (there is only one species) is a berry, like the fruit of *Gethyllis* species. Hutchinson placed *Gethyllis* and *Apodolirion* in the tribe *Zephyrantheae* and this grouping is supported by cytological evidence since very few Amaryllids with inferior ovaries have retained the basic chromosome number of 6 as is the case in these plants.

In a brief note Traub (1965) modified his system in accordance with newer evidence (Wilsenach, 1965). He still separated the genera *Gethyllis* and *Klingia,* awaiting verification of fruit character referred to above. His tribe *Crineae* has been modified to accomodate also the genera *Hessea* and *Strumaria,* but he gave 6 and 11 as the haploid chromosome numbers of this tribe. In actual fact most genera and species have 11 as the haploid number, but n=6 has not been reported for any of the *Crineae.* Some have 12 as the haploid number.

## LITERATURE CITED

Guows, J. B. 1949. Karyology of some South African Amaryllidaceae. *Plant Life 5*: 54-81.

Hutchinson, J. 1934. Families of flowering plants. *2*: 81-141. MacMillan and Co., London.

Pax, F. and Hoffman, K. 1930. Amaryllidaceae. Engler and Prantl. *Nat. pflzfam. 15a*: 391-430.

Traub, H. P. 1963. The Genera of Amaryllidaceae. Amer. Plant Life Soc. Publication.

Traub, H. P. 1965. Addenda to Traub's "The Genera of Amaryllidaceae" (1963) Plant Life *21*: 88-89.

Wilsenach, R. 1965. On the karyology and phylogeny of some genera ofthe Amaryllidaceae. Plant Life *21*: 82-88.

# AMARYLLID NOTES, 1966

Hamilton P. Traub

### **Eucrosia eucrosioides** var. **rauhiana** (Traub) Traub, **comb. nov.**

syn.—**Callipsyche eucrosioides** var. **rauhiana** Traub, in Plant Life 13: 61. 1957.

### **Pancratium centrale** (Chev.) Traub, **err. "P. centralis"**

Plant Life 19: 59. 1963. Syn.—**Mizonia centralis** Chev., in Rev. Bot. Appliq. 30: 626; 628, pl. 33 & 34. 1950.

### **Agapanthus africanus** var. **henryae** Traub, **var. nov.**

Haec varietas a forma typica speciei floribus albis recedit.

Holotype (nomenifer): Traub #991 (TRA), June 18, 1965, grown at La Jolla, Calif.

This is a beautiful pure white variety, of the blue **Agapanthus africanus,** described from stock furnished by Mrs. Mary G. Henry, Gladwyne, Penna. It is very much worth growing in the garden in the South and in pot culture in the North.

### **Stenomesson moldenkei** Traub, **sp. nov.** (Amaryllidac.)

Herba bulbosa; collo bulbi ca. 11 cm. longo, 1 cm. lato; foliis cum floribus sub ad anthesi productis lineari-acutis usque ad 33 cm. longis, 6—8 mm. latis; pedunculo usque ad 28 cm. alto; valvis spathae ab exemplari typico absentibus; umbella 4—6-flora; pedicellis inter se in longitudine variis 1.5—3 cm. longis; ovario sub anthesi 6 mm. longo; perigonia aurantiaco, ca. 4 cm. longo, apice segmentorum subviridi; tubo teplaorum usque ad 2.6 cm. longo, ad basin ca. 3 mm. lato, ad apicem usque ad 5 mm. dilatato; segmentis tepalorum 1.4 cm. longis, 6—7 mm. latis, elliptico-acutis; cyatho staminorum 7 mm. longo, inter filamenta microscopice irregulariterque emarginato; staminibus segmenta tepalorum subaequantibus; filamentis filiformibus 5 mm. longis; antheris 6 mm. longis; stylo staminibus paulo breviore; stigma capitato. Holotype: Ferreyra #6922 = #176 (TRA).

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**Eustephia latifolia** (R. E. Fries) Traub, **comb. nov.** Syn.—**Eustephiopsis latifolia** R. E. Fries, in Act. Soc. Sci. Upsal. Ser. IV. 1: 164—165, pl. 8, figs. 12 & 13. 1905.

**Eustephia speciosa** (R. E. Fries) Traub, **comb. nov.** Syn.—**Eustephiopsis speciosa** R. E. Fries, 1. c. 163-164, pl. 8, figs. 14 & 15. 1905.

**Habranthus paxii** Traub, **nom. nov.** Syn.—**Hippeastrum tubispathum** Pax, in Engl. Bot. Jahrb. 11: 329—330, pl. 7, fig. 9. 1890.

**Eucrosia mirabilis** (Bak.) Traub, **comb. nov.** Syn.—**Callipsyche mirabilis** in Saund. Refug. Bot. pl. 168. 1868-73.

**Eucrosia aurantiaca** (Bak.) Traub, **comb. nov.** Syn.—**Callipsyche aurantiaca** Bak., in Saund. Refug. Bot. pl. 167. 1868-73.

**TRAUB—AMARYLLID NOTES, 1966,** continued on page 5.

# REGISTRATION OF NEW AMARYLLID CLONES

Mr. W. D. Morton, Jr., *Emeritus Registrar*
Mr. Edward F. Authement, *Registrar*
Mrs. Emma D. Menninger, *Associate Registrar*

This department has been included since 1934 to provide a place for the registration of names of cultivated *Amaryllis* and other amaryllids on an International basis. The procedure is in harmony with the International Code of Botanical Nomenclature (edition publ. 1961) and the International Code of Nomenclature for Cultivated Plants (edition publ. 1958). Catalogs of registered names, as well as unregistered validly published names, will be published from time to time as the need arises. The first one, "Descriptive Catalog of Hemerocallis Clones. 1893-1948" by Norton, Stuntz and Ballard was published in 1949. This may be obtained at $2.50 prepaid from: Dr. Thos. W. Whitaker, Executive Secy., The American Plant Life Society, Box 150, La Jolla, Calif. Catalog of Hybrid Nerine Clones, 1882-1958, by Emma D. Menninger; and Catalog of Brunsvigia Cultivars, 1837-1959, by Hamilton P. Traub and L. S. Hannibal, were published in 1960 Plant Life, with additions to both in Plant Life 1961. In Plant Life 1961, the first edition of The Genus X Crinodonna was published which serves also as a catalog of cultivars. In Plant Life 1964, the first edition of "Catalog of Hybrid Amaryllis Cultivars, 1799 to Dec. 31, 1963" was published. Other catalogs of cultivated amaryllids are scheduled for publication in future issues.

Only registered named clones of Amaryllis and other amaryllids are eligible for awards and honors of the American Amaryllis Society at Official Amaryllis Shows.

Correspondence regarding registration of all amaryllids such as *Amaryllis, Lycoris, Brunsvigia, Clivia, Crinum, Hymenocallis,* and so on should be addressed to Mr. Edward F. Authement, *Registrar,* 2214 Gallier St., New Orleans, Louisiana 70117. The registration fee is $2.00 for each clone to be registered. Make checks payable to American Plant Life Society.

## CORRIGENDA

Plant Life, Vol. 21, 1965

Registration of New Amaryllis Clones

Page 51, line 8 from bottom, "G. C. Van Waveren & Sons" read "G. C. Van Meeuwen and Sons".
Page 98, line 23 from bottom, for "D-15A" read "D-5A".

## NEW AMARYLLIS BREEDERS, 1965

Abbrev.

Forb.—Mrs. Sam Forbert, 1910 Evergreen Lane, Hattiesburg, Miss.
Stat.—Mrs. Ioma Staton, 1216 Roosevelt Ave., San Antonio, Tex.

# AMARYLLIS CLONES REGISTERED IN 1965

EDWARD AUTHEMENT, *Registrar*

**Registered by Robert D. Goedert,** Jacksonville, Fla. for Harry de Leeuw Co., Ltd., South Africa.

**'Redstone'** (HDL—1964), R; A-823, D-5A; U-4fld; 12"h; fls. 5½" diam; dutch vermilion (HCC-717), darker shade in throat. I—Goed. 1964.

**'Red Rover'** (HDL—1964), R; A-824, D-5A; U-4fld; 10"h; fls. 6" diam; vermilion (HCC-18), faint white blotch in upper 3 segs. I—Goed. 1964.

**'Red Hood'** (HDL—1964), R; A-825, D-5A; U-4fld; 14"h; fls. 7" diam; scarlet (HCC-19). I—Goed. 1964.

**'Vintage'** (HDL—1964), R; A-826, D-5A; U-2-3fld; 17"h; fls. 7" diam; indian lake red (HCC-826). I—Goed. 1964.

**Registered by G. C. Van Meeuwen & Sons,** Heemstede, Holland

**'Berenice'** (VM—1964), R; A-827; D-5A; U-5fld; 18"h; fls. 7" diam; currant red (HCC-821) with velvety sheen; spr. dec.

**'Daphne'** (VM—1964), R; A-828, D-5A; U-4fld; 20"h; fls. 8" diam orient red (HCC-819), green to white midribs ¾ up segs, white pencil stripes each side midrib in upper 3 segs; spr, dec.

**'Durango'** (VM—1963), R; A-829, D-5A; U-4fld; 21"h; fls. 8" diam; signal red (HCC-719), cardinal red throat; spr, dec.

**'Fortuna'** (VM—1964), R; A-830, D-5A; U-4fld; 18"h; fls. 6-7" diam; poppy red (HHC-16/1), darker shade in throat; spr, dec.

**'Hecuba'** (VM—1963), R; A-831, D-5A U-3-4fld; 22"h; fls. 7" diam; mandarin red (HCC-17), darker shade in throat, green midrib on reverse side; spr, dec.

**'Odin'** (VM—1963), R; A-832, D-5A; U-4-6fld; 18"h; 7" diam; signal red with cardinal red ring in throat, creamish midrib; spr. dec.

**'Orin'** (VM—1964), R; A-833, D-5A; U-4fld; 25"h; fls. 9-10" diam; vermilion red (HCC-18) on white, white border around edge of all segs; spr, dec.

**Registered by Mrs. Sam Forbert,** 1910 Evergreen Lane, Hattiesburg, Miss.

**'Lisa Forbert'** (Forb.—1965), R; A-834, D-8; U-3-4fld; 18"h; fls. 4½" diam; chartreuse with picotee edge; spr.

**'Shocking Pink'** (Forb.—1965), R; A-841, D-5A; U-4fld; 18"h; fls. 8" diam; neyron rose (HCC-623/1), light green throat; spr.

**Registered by Mrs. Paul A. Kane,** 1001 McIlvaine St., San Antonio, Tex.

**'Ioma Staton'** (Stat.-1967), R; A-835, D-7; U-4fld; 22"h; fls. 7½" diam; scarlet (HCC-19), minute amount of white deep in throat. I—Kane, 1967.

**Registered by Ludwig & Co.,** Hillegom, Holland.

**'Front Page'** (Lud.-1965), R; A-836, D-5A; U-4fld; 26/28"h; fls. 7/9" diam; scarlet (HCC.-19) with bloodred throat; spr.

**'Gipsy Giant'** (Lud.-1965), R; A-837, D-5B; U-4fld; 30"h; fls. 8/9" diam; with white suffused with salmon pink and distinct white star in throat; spr.

**'Scarlatto'** (Lud.-1965), R; A-838, D-5B; U-4fld; 26/28"h; fls. 7/9" scarlet (HCC-19) with bloodred throat; spr.

**'Sparkling Gem'** (Lud.-1965), R; A-839, D-8 (Gracilis); U-4/6fld; 20/24" h; fls. 3/4" diam; dark orient red, darker throat; spr.

**'White Witch'** (Lud.-1965), R; A-840, D-5B; U-4fld; 23/25"h; fls. 9/10" diam; white with applegreen throat; spr.

**Registered by Mrs. Sam Forbert, 1910 Evergreen Lane, Hattiesburg, Miss.**

**'Leslie Forbert'** (Forb. 1965), R; A-842, D-5A; U-4fld; 18"h; fls. 8" diam; camelia rose with scarlet throat; spr.

# CRINODONNA CLONE

**Introduced by Mrs. Polly Anderson, 4810 Palm Drive, La Canada, Calif.**

**'Raspberrg Ice'**, Flowers drooping, a deep raspberry color, open faced, 7-15 flowers per umbel; scape 4ft. tall; October to December.

# PROCEDURE FOR STAGING AMARYLLIS SHOWS

EDWARD F. AUTHEMENT, *Registrar*

There seems to be a great deal of confusion and misunderstanding regarding the staging of official Amaryllis shows. The Men's Amaryllis Club of New Orleans, Inc. and The Garden Circle Amaryllis Club of New Orleans have been staging shows every spring for the past several years. With the help of Mrs. W. D. Morton, Jr., and after her passing, Mr. Morton, a certain procedure of the entire operation with less confusion and a more simplified method has gradually evolved. The following is submitted here with the hope it may be of some help to Amaryllis Clubs who stage official shows.

First, of course, the club must decide if it will stage an Amaryllis show and set the date. This must be decided early (Oct. or Nov.) in order that the show committee has ample time to make up the show schedule and appoint the various committees for the show. The Club's President then appoints the show chairman. With the help of past presidents and Show Chairmen, the new Chairman appoints the various committees who will be responsible for staging the show.

The most important of these, of course, is the classification committee. This committee should be the first to approve or reject the entries. It must also mark the entries as to flower division and correct name of the clone or species. The committee should consist of at least three members who are well familiar with the specimens likely to be offered for exhibit. This committee may also mark the entry as to their proper placement on the exhibit tables.

The registration committee has the task of filling the registration cards with the exhibitor's name, address, phone number and name of the clone or species being entered.

The placement committee is charged with the placing of the exhibits in their proper place on the tables. The exhibitor should never be allowed to bring specimens on the floor of the show room at any time. This is better done by the placement committee.

The publicity committee has the task of writing up the results of the show immediately after judging, for publication in the local newspaper.

The chairman of judges must contact the Amaryllis Judges for the show and advise them of the date and time for judging. The chairman also instructs the judges as to the various sections and their location on the floor. If special awards are to be made, the judges are so instructed and asked to designate the variety winning the award.

The duties of Hospitality is to provide refreshments for the judges and entertain prominent visitors.

The properties committee must see to it that all the necessary items used at the show are provided for. The arranging of the exhibit tables, the necessary identifying cards for sections and exhibits, and the general set up of the show is the job of all the club members. This is generally supervised by the show chairman or the co-chairman.

The chairman of clerks is responsible for instructing the clerks as to their duties in helping the judges and general supervision of the clerks while judging is taking place.

The show standards chairman is the go-between member who reports the results of the show to the Editor of the Amaryllis Year Book and interpreting the show rules as set forth by the American Amaryllis Society.

There are two arrangement choices by which an Official Amaryllis Show can be conducted. *First* is by *Flower division* and *color values.* This is by far the more simple method and less complicated. It was the method used before World War Two. The specimens are exhibited according to flower division and color values. The grower or country of origin is disregarded.

The *second* choice is by staging the exhibits as *Dutch* and *American* clones. The specimens are then separated according to the Amaryllis flower division and clones. The clones govern the color values and are separated as such. The species are always exhibited in one group, separated by color, with identifying cards.

In the second method, confusion is always the case when trying to distinguish between the Dutch and American clones. Hybridizing in this country and elsewhere has progressed to the extent that Amaryllis from all over the world can compete favorably with the Dutch clones. This method was allowed by the American Amaryllis Society after the second World War because the Dutch Amaryllis and American clones were the main ones on the market. It was always hoped by the Society that the various Amaryllis clubs who stage shows would go back to the pre-war method when sufficient clones were available.

The Garden Circle Amaryllis Club of New Orleans have staged their show since 1963 according to *flower division* and color values and growers. The Houston Amaryllis Society, Houston, Texas, have been staging shows for the past eight years, according to the Amaryllis flower division and color values. There are probably other clubs who do the same. Both of the clubs named above have found this method to be less complicated and easier. It also tends to be a more orderly show and permits fair competition by various growers.

The staging of Amaryllis Shows by the flower division and color values also minimizes the work of the judges. This is very important. The judges can do their work faster and are not hampered by exhibits of the same flower division being placed or scattered all over the floor. The judges are instructed to judge the individual exhibits according to the perfection of the flower and plant in each division. The point scoring is used by all Amaryllis judges and the country of origin makes no difference.

The following is an example of the schedule of the Men's Amaryllis Show of New Orleans for 1966.—Table 1.

Table 1. The Men's Amaryllis Club of New Orleans, Inc., 1966 Show Schedule.

All specimens must have three or more florets per scape to be eligible for entry in competition in any section.

**POTTED PLANTS**

**SECTION I—REGISTERED AND NAMED**

| | | |
|---|---|---|
| Division 2—Long Trumpet Hybrids | (D-2) | By name |
| Division 3—Belladonna Type Hybrids | (D-3) | By name |
| Division 4—Reginae Type Hybrids | | |
| a—Markedly imbricated type | (D-4a) | By name |
| b—Less imbricated type | (D-4b) | By name |
| Division 5—Leopoldi Type Hybrids | | |
| a—Markedly imbricated type | (D-5a) | By name |
| b—Less imbricated type | (D-5b) | By name |
| Division 6—Orchid-Flowering Hybrids | (D-6) | By name |
| Division 7—Double Hybrids | (D7) | By name |
| Division 8—Miniature Hybrids | (D-8) | By name |
| Division 9—Unclassified Hybrids | (D-9) | By name |

**SECTION II—UNREGISTERED AND UNNAMED (BREEDER'S)**

| | | |
|---|---|---|
| Division 2—Long Trumpet Hybrids | (D-2) | By color |
| Division 3—Belladonna Type Hybrids | (D-3) | By color |
| Division 4—Reginae Type Hybrids | | |
| a—Markedly imbricated type | (D-4a) | By color |
| b—Less imbricated type | (D-4b) | By color |
| Division 5—Leopoldi Type Hybrids | | |
| a—Markedly imbricated type | (D-5a) | By color |
| b—Less imbricated type | (D-5b) | By color |
| Division 6—Orchid-Flowering Hybrids | (D-6) | By color |
| Division 7—Double Hybrids | (D-7) | By color |
| Division 8—Miniature Hybrids | (D-8) | By color |
| Division 9—Unclassified Hybrids | (D-9) | By color |

**SECTION III—A. Cultivated Wild Species** ............(D-1) By name

**SECTION IV—UNREGISTERED AND NAMED**—Same standards as Section I

**CUT SCAPE SPECIMENS**

**SECTION V**—Same standards as Section I ..................By name
**SECTION VI**—Same standards as Section II ................By color

**SINGLE FLORET SPECIMENS**

**SECTION VII**—Registered and named specimens only ......By name (Competition in this section open only to members of the Mens Amaryllis Club of New Orleans, Inc.).

**ARRANGEMENTS FEATURING AMARYLLIS** ........According to theme

### AWARDS

**The usual Ribbons**—1st, 2nd, 3rd and honorable mention—will be awarded in sections I, II, III, V, and VI.

**Tri-Color Ribbons**—to be awarded to the outstanding specimen in Section I and Section II.

**Sweepstakes Ribbons** to be awarded, one each for most blue ribbons in Section I and Section II.

**American Plant Life Society Awards of Merit and Preliminary Commendations** to be awarded in accordance with rules of that society to meritorious specimens in Sections I, II, V and VI, as warranted.

**CUPS—Gold Cup** to Tri-color winner of Section I (Jessee)
**Gold Cup** to Tri-color winner of Section II (Rose Garden Center)
**Silver Cup** to Sweepstakes winner of Section I (Swetman)
**Gold Cup** to Sweepstakes winner of Section II (Reuter)
**Gold Cup** for most blue ribbons won in Sections I, II, III, V and VI together by a member of Men's Amaryllis Club of New Orleans, Inc.
**Silver Tray** to winner of most blue ribbons in Sections I and V (Swetman)
**Gold Cup** to best home-bred, grown and developed Amaryllis entered in either Section I or Section II (Alatex)

The following is an example of a schedule permitted after the second World War and used by the Men's Club in the past:

### Horticulture

#### Section 1

Class 1 Named Dutch Hybrids (Registered)
Class 2 Named Dutch Hybrids (Unregistered)
Class 3 Unnamed Dutch Hybrids (By Color)
Class 4 Dutch Seedlings, First Year Bloom
Class 5 Dutch Seedlings, Later Bloom

#### Section 2

Class 1 Named American Hybrids (Registered)
Class 2 Named American Hybrids (Unregistered)
Class 3 Unnamed American Hybrids (By Color)
Class 4 American Seedlings, First Year Bloom
Class 5 American Seedlings, Later Bloom

#### Section 3

Class 1 Double Hybrids
Class 2 Miniatures or Dwarf—Dutch Hybrids
Class 3 Miniatures or Dwarf—American Hybrids
Class 4 Miniatures or Dwarf—Double Hybrids
Class 5 Any Species. This includes **A. x johnsonii.**

In conclusion, we wish to point out to the Amaryllis Clubs that the physical set-up of the exhibits on the show floor is entirely up to the Show Committee. However, every effort should be made to make the work of the judges as easy as possible.

## HERBERT'S "AMARYLLIDACEAE" (1837) REPRINTED

The firm, Verlag von Cramer, 694 Wienheim, Germany, will reprint Herbert's "Amaryllidaceae" (1837), with an introduction by H. P. Traub, in 1966. The many who have wanted a copy of this classic are now given the opportunity of obtaining this classic. The pre-publication or subscription price is $30.00; after publication, the price is $40.00. Send orders directly to the publisher.

# AMARYLLID GENERA AND SPECIES

Harold N. Moldenke

[In this department the descriptions of amaryllid genera and species, particularly recent ones, translated from foreign languages, will be published from time to time so that these will be available to the readers.]

Section *Eutulbaghia,* genus *Tulbaghia,* Baker, J. Linn. Soc. Bot. 11: 370. 1871. Stamens fleshy, grown together with the corona, rarely almost free; staminodes deeply emarginate, free or connate only at the base (*capensis*) [or] grown together with an entire or crenate corona; corona 2—3.2 mm. high; leaves fleshy-herbaceous, 4.2—6.2 mm. wide or even wider (*alliacea*) [or] firm, filiform, 1.1—2.1 mm. wide (*acutiloba*); [or] corona 1.1 mm. high; perianth-segments obtuse, scarcely surpassing the corona (*dregeana*); [or] segments linear, 4—6 times as long as the corona (*hypoxides*).

Section Omentaria, genus Tulbaghia, Baker, J. Linn. Soc. Bot. 11: 370. 1871. Staminodes small, strap-shaped, all free from each other; leaves 1.1—2.1 mm. wide; perianth 1.1—1.3 cm. long (*cepacea*) [or] leaves 4.2—6.3 mm. wide; perianth 1.7—1.9 cm. long (*violacea*).

*Pancratium parviflorum* J, Decaisne, in Ann. Sci. Nat. Ser. II. Bot. 4: 346. 1835. Scape slender; umbel many-flowered, perianth-segments oblong-lanceolate, green on the back, fleshy-apiculate; the segments [divisionals] of the corona subequaling the filaments; anthera ovate; style surpassing the stamens; ovary ovate-globose.

Subtribe *Miluleae (Milulinae),* Prain, tribe Allieae; in Ann. Roy. Bot. Gard., Calcutta 5(2): 164. 1896. Bulb tunicated; spike terminating a simple leafless scape; bract 1, membranous, beneath the spike; bracteoles none; perianth gamophyllous; androecium regular; capsule loculicidally dehiscent.

Genus *Milula* Prain, Subtribe *Milulinae* Prain, tribe *Allieae;* in Ann. Roy. Bot. Gard., Calcutta 5(2): 164—165. 1896. Bulb tunicated; leaves strap-shaped; inflorescence spicate, covered by a solitary membranous bract; perianth gamophyllous, 6-parted, the lobes rounded; stamens shortly epiphyllous, 6, opposite the petals; ovary syncarpous, 3-celled; style simple, filiform; ovules 2 in each cell; capsule loculicidally dehiscent; seeds 2 or 3; testa corrugated and very minutely punctulate.

*Milula spicata* Prain, in Ann. Roy. Bot Gard. Calcutta 5(2): 165. 1896. Bulk leek-colored, 4—7 cm. long, the scales fibrous, 2.5—3.5 cm. long, the roots 4—5 cm. long; leaves green, 10—15 cm. long, 3.3—5 mm. wide; scape green, free, 6—9 cm. long, 2.5—3.3 mm. thick; spike 2—5 cm. long, 1 cm. in diameter; bract 3 cm. long and 2 cm. wide; florets 2.5 mm. wide, the perianth 2.5 mm. long, the filaments 4—5 mm. long; ovary 1.5 mm. in diameter; style 2 mm. long; stigma very small, capsule slender, 3 mm. wide; seeds 2.5 mm. long, 1.5 mm. in diameter.

CRINUM CLONE 'GULF PRIDE'—continued from page 56.

that its pollen will strike quite readily on *C. Bulbispermum, C.* x 'Cecil Houdyshel'' and *C. americanum.* Thus *if it will* strike on *C. Scabrum* and give backcross hybrids closely resembling *scabrum* we could confirm the cross.

Since the hybrid is definitely not *C. Kunthianum* we propose the garden name of 'Gulf Pride' since it is fairly wide spread in the south, a very good garden subject, and fairly hardy. And above all has a very well formed umbel of blossoms that are excellent for cutting and display purposes. We feel that the proposed garden name is well justified.

At this time we cannot determine if 'Gulf Pride' is the same clone as *C.* x *herbertii,* a cross between *bulbispermum* and *C. scabrum* which is described on page 273 of Dean William Herberts fascinating publication of 1837. Herbert presumably effected his cross sometime around 1815. Dr. Thaddus Howard has effected several similar crosses. His recently named hybrid *C.* x 'Thaddus Howard' is quite an outstanding plant for the form, quality and color of its near rose blossoms. The latter plant is much hardier than 'Gulf Pride'.

PLANT LIFE LIBRARY—continued from page 24.

PHYLOGENY AND FORM IN THE PLANT KINGDOM, by H. J. Dittmer. D. Van Nostrand Co., 120 Alexander St., Princeton, New Jersey. 1964. Pp. 642. Illus. This attractive book was designed "not only for the college student interested in continued work in botany, but also for the nonprofessional who may want a terminal course in this field. The term "plant kingdom" is used in a wide sense to include (1) the bacteria (Schizomycophyta) plus Blue-green algae (Cyanophyta); (2) the aglae; (3) the fungi (Myxomycophyta and Eumycophyta); (4) the Bryophyta; and (5) the vascular plants (Tracheophyta). In the text each topic is adequately illustrated and discussed. This stimulating text is highly recommended.

THE NATURE OF THE NATURAL SCIENCES, by Leonard K. Nash. Little, Brown & Co., 34 Beacon St., Boston 6, Mass. 1963. Pp. 406. Illus. $6.50. This is among the outstanding texts on the philosophy of science. The subject is presented in all its aspects in the context of actual events in the history of science. The book is concisely written in easily readable English. The chapter headings are: common sense (and science); science (and common sense); the anatomy of science; cosmology and technology; colligative relations and scientific laws; empirical tools and empiricism; the principles of science; theories and models; the evolution of scientific theories; organized science; creative science; and the real world. If a person could have only one text on the philosophy of science, this is the one which should be chosen. Highly recommended.

THE PHOTOCHEMICAL ORIGIN OF LIFE, by A. Dauvillier. Academic Press, 111 5th Av., New York, N. Y. 10003. 1965. Pp. 193. Illus. $7.50. We are indebted to Scripta Technica, Inc., for this fine translation into English. Prof. Dauvillier explains his ideas on the origin of life as an interdisciplinary subject of cosmic physics involving astronomy, geophysics and geochemistry. He emphasizes the role of paleovulcanism in bringing about the pyrogenetic synthesis of numerous heterocyclic compounds; and suggests that after condensation of the oceans, photochemical reactions occurred with the capacity of creating the optical rotation characteristic of living matter. This stimulating text is highly recommended.

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# 3. GENETICS AND BREEDING

## ENJOYING AMARYLLIS THE YEAR 'ROUND

V. Roger Fesmire,

*16938 Elgar Ave., Torrance, Calif. 90504*

In a previous article in the 1963 Year Book, there was outlined a 3-point program which I intended to follow in an attempt to secure flowers the year around in a small greenhouse in Colorado. Some results can now be reported, particularly under the first point of the propram: careful bulb management.

There is no doubt that all *Amaryllis* bulbs, even species and evergreen types, require a definite resting period before blooming. I have noticed that even bulbs being raised from seed will take a rest, when they seem to stand still, before sending up their first flower scapes. When bulbs are grown in flower pots, it is possible to manipulate this resting period to a certain extent. By beginning the rest period of different bulbs in different months, I found it was possible to spread out the blooming season over a much longer period of time. In 1962, most of my bulbs bloomed, in the greenhouse, during February and March. By 1964, the main blooming season had been spread out over four months, with some flowers during eleven months of the year. It should be noted that some bulbs are very easy to handle in this way, particularly those with *Amaryllis striata* genes in their immediate ancestry, while others will persist in blooming late in the spring regardless of when their rest period is begun, and some are always quite unpredictable in their behavior.

In the previous article, a reference was also made to the orange-scarlet Houdyshel hybrids, which I had purchased under the name of "Rutila hybrids." These evidently do have some *Amaryllis striata* genes in their ancestry as Mr. Houdyshel believed, for they are very easy to bring into bloom at different times. I have had flowers from them in eight different months of the year. They also resemble *A. Striata* in their tendency to decay about the neck of the bulb; planting the entire bulb below the soil level helps to prevent this condition. Although I found it difficult to secure a self-cross with these bulbs, one was finally successful. The first seedlings have just bloomed (July, 1965), and the flowers are almost identical with the Houdyshel hybrids, indicating this strain is fairly well fixed. Both the original bulbs and the seedlings, however, resent being repotted or completely dried off, and resume growth again very reluctantly. When I moved from Denver to southern California about four months ago, I brought with me only two bulbs of the original Houdyshel hybrids, dried off and packed in bags, as were most of my other mature bulbs. All of the other bulbs, with one exception, have resumed growth again since being repotted, but not these two!

The Houdyshel hybrids were also crossed with *Amaryllis striata* var. *fulgida*, and the results so far have been quite a surprise. The cross was made both ways, but the plants with *striata* as the pollen parent grew much faster and resemble more the Houdyshel hybrids in leaf characteristic than the plants with *striata* as the seed parent. The first seedling bloomed this past January in 4″ pots in the greenhouse, but the flowers bore no resemblance to the Houdyshel hybrids. They did resemble very closely *A. striata* var. hana, in size, color, and scape height. The first seedling to bloom of the reverse cross is now sending up a flower bud, and since the plant resembles *A. striata* in leaf, I am very curious to see what type of flower it produces.

Most of my breeding work can be classified under the second point of my 3-point plan, which is to produce a strain of *Amaryllis* that will be recurrent in its blooming habits, and also small enough both in foliage and bulb size to be grown satisfactorily on a window sill in the house or in a small greenhouse. A number of plant breeders in the past have produced such hybrids, although their work has apparently been lost. Possibly some member of this society is even now growing such a type of *Amaryllis,* and if so, I would apreciate hearing about it.

Most work along this line in the past has apparently been done with *A. Striata,* var. *fulgida,* as one of the parents, since it is a recurrent bloomer. In my greenhouse in Colorado, this species bloomed every four to eight months, and so it has been used extensively in my program. Close to a hundred crosses involving this species have been made so far, and some have already bloomed, with gratifying results in respect to flowers, but only a few bulbs show definite promise of being recurrent in bloom habit. However, back-crosses and self-crosses have been made, and in these the recurrent-blooming trait will perhaps appear more frequently. In addition to these crosses, several crosses have been made between *A. Striata* and a miniature hybrid from India, which hybrid flowers regularly every six months. These seedlings have not yet reached blooming size, but I anticipate much from them. Many of the crosses have produced plants of small size, and so it is now evident that the most difficult part of the goal is to secure the recurrent-blooming habit. As an individual ''bonus'', growing *Amaryllis* from seed is another method of securing flowers all the year around, since bulbs grown from seed are likely to send up their first flower scape at any time of the year.

The third point of my program is to develop hybrids which will bloom naturally at other seasons of the year in addition to the spring season. This means going back to species which bloom at other seasons of the year for breeding stock. Here I have made but little progress, although such species and hybrids do exist. I have a considerable number of species growing, but few have bloomed thus far. Crosses involving *A. aulica* have not been successful, although four crosses involving *A. pardina* are now growing nicely. At the present time, a flower bud is showing on an *aulica* cross which I recently secured from an importer, and other species should bloom for me this fall. More material is being acquired steadily, and eventually I expect to report results along this line also.

# SOME THOUGHTS ON NERINE HYBRIDS

EMMA D. MENNINGER, *California*

## WHITE NERINES

Because of the dearth of pure white Nerines, both species and hybrids, I have attempted to hybridize a few of the white clones in our collection. From the Exbury Collection, we have 'King of the Belgians' X 'Pure White'; 'Snow'; 'Snowflake'; 'Solent Swan' and 'White', the latter sometimes has a faint tinge of pink. Of our own pure white hybrids, we have the following cultivars: 'Angel Wings'; 'Crystal Palace'; 'Denali'; 'Snow White' and a former clone 'Star White' which has since died, although we have two unflowered seedlings from it. For several years, I have isolated these white clones when in flower and have intercrossed them, not having the time to make specific crosses so that the pollen parent is known. Before this project, one of the earlier crosses with seed from the pure white 'Crystal Palace' disappointingly gave a pale pink hybrid.

Because of the scarcity of white species and hybrids, I suspect that white is recessive to pink and probably to other colors. There are reported to be two white sports of species, one of *bowdenii* and one of *sarniensis.* The former *bowdenii* var. *alba,* received an AM, RHS for Veitch on September 26, 1911. The *sarniensis* was reported by Mrs. Sina Eliofson in ''South African Flowers for the Garden'' as a pure white found on Table Mountain. The only other white species that I recollect is *Nerine pudica* which is white with pink median lines on the tepalsegs, or sometimes it is more or less pink. There is a good colored illustration of *N. pudica* in the Botanical Magazine, t. 5901. So far as I can ascertain the species *flexuosa* var. *alba* is pale pink, at least those in cultivation appear to be pink.

Besides the aforementioned white *Nerine* hybrids, there are three white cultivars listed in my ''Catalog of Hybrid Nerine Clones'' in the Amaryllis Yearbook for 1960. These are 'Candida', pure white, 'Snowdrift', good white and 'White Knight', the latter with pink median lines. 'Alice' the parent of the tetraploid 'Inchmery Kate' was said to be white with rose suffusion.

Whether any of the white species mentioned or the last four cultivars are in cultivation is unknown to me. It is interesting to speculate whether these white hybrids may have *N. pudica* in the background. These might include several whites with pink median lines on the tepalsegs that have appeared among our seedlings, the first of which was named 'Candystick'.

However, I am interested in securing more pure white hybrids. Hopefully, this season, a few may appear in our older seedlings with white seed parents, including a cross of 'Snowflake' ♀, a sibling of 'Snow White'; two of 'Star White' ♀ and a number of seedlings from 'Crystal Palace' ♀. Later white crosses are too small to flower.

The writer would be pleased to hear of any other pure white species or hybrids.

Table 1.

**Royal Horticultural Society Awards to Hybrid Nerines, 1960-1964**

| NAME | TO | AWARD | DATE | DESCRIPTION |
|---|---|---|---|---|
| 'Angela Limerick' | Clarke | AM | 8/27/60 | Bright Dutch vermilion |
| 'Carolside' | de Rothschild | AM | 9/11/60 | Mandarin red (HCC 17/1) 'Rotherside' x 'Herga' |
| 'Plymouth' | de Rothschild | AM | 9/11/60 | Claret rose (HCC 021) 'Joan' x 'Herga' |
| 'Dorothy' | Clarke | PC | 9/11/60 | No description |
| 'Norah Hamilton' | Clarke | PC | 8/27/60 | No description |
| 'Nicholas' | de Rothschild | PC | 9/25/60 | No description |
| 'Pamela' | de Rothschild | AM | 9/25/60 | Dawn pink (HCC 523/1) 'Aerolite' x 'Queen Mary' |
| 'Susan' | de Rothschild | PC | 9/24/61 | [Very fine large light pink] |
| 'Egryn' | de Rothschild | PC | 9/24/61 | No description |

There appear to be no further awards through 1964.

ABBREVIATIONS

| | |
|---|---|
| AM | Award of Merit |
| PC | Preliminary Certificate |
| Clarke | Sir Ralph Clarke, Borde Hill, Haywards Heath, Sussex, England |
| de Rothschild | Edmund de Rothschild, Exbury nr Southampton, Hampshire, England |

## MINIATURE NERINES

Hybrid miniature counterparts of well-loved larger flowers are now much in vogue and hybridizers are at work to fill this demand. Roses, Dahlias and Orchids are among those that are popular. In orchids, miniature Cymbidiums bred from the dwarf species such as *pumilum* and *ensifolium* are being raised by the thousands in Southern California and these are receiving as many or more awards than the standard Cymbidiums.

So far as I am aware miniature hybrids are practically unknown among Nerines. A species that offers promise in this direction, is *Nerine filifolia* with thread-like or chives-like leaves that with us are evergreen. Dainty pink flowers surmount the dark green foliage.

Dr. Hamilton P. Traub has made a beginning to correct this deficiency by crossing *filifolia* with pollen of the larger-flowered hybrids and species. One of his hybrids of *filifolia* with 'Rosalba' flowered in two years from seed. This short period from seed to flowering and the fact that the seedlings are evergreen, gives much encouragement to continue this type of breeding. I am sure that we shall hear more of this interesting project.

No doubt there are other dwarf species than *filifolia,* such as *masoniorum,* that could produce miniature hybrids, but my knowledge of these is too meager to mention some that might qualify as good subjects for hybridization. Also, although the fertility between dwarf and larger species may be low, a few seedlings from each crossing will be worthwhile and it will be interesting to learn if these miniature hybrids will produce seed and if they can be back-crossed with the dwarf parents or other dwarf species.

This is only a hint of the fascinating possibilities in this line of breeding.

## VIRUS DISEASES

A practically incurable disease of virus origin may infect Nerines. In some types, the leaves become streaked with lighter green or yellow and the plant becomes stunted. I have noticed a few pots of Nerine hybrids with these symptoms. Some have been destroyed, preferably by burning, but a few others were sent to the virologists of the University of California for diagnosis. So far, I have had no report on these. Virus diseases of various types occur in many plants including Amaryllis and Orchids. It is spread by insect vectors, contaminated cutting tools and possibly reused stakes, etc. Dr. Traub in his book ''The Amaryllis Manual'', 1958 (p. 179) has an enlightening section on virus diseases of amaryllids. He mentions Dr. Georges M. Morel's (1955) proposed method of eradication of virus by culturing the apical growing point which is believed to be free of virus.

A few weeks ago, I met and talked with Dr. Morel and heard his lecture which was primarily devoted to the multiplication of callus tissue from the apical meristem of orchids by aseptic tissue culture to increase division of valuable clones. Dr. Morel was not sanguine regarding the eradication of virus by this method and I had the feeling that the method was, at least, somewhat disappointing. So it, therefore, behooves the grower to be alert and destroy suspected plants before the disease spreads to healthy ones.

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## NERINES IN ENGLAND

J. T. Gallagher, *England*

The old adage about travel broadening the mind might equally well apply to our plants as to the eminent Victorians about to embark on the Grand Tour. Two examples immediately spring to mind, the extraordinary evolution of the Camellia since it emigrated from China and Japan to your Southern States and the *Nerine* which after a lengthy stay in England is only now returning to its native South Africa in a decidedly sophisticated form. Gilding the Nervine Lily began in the first quarter of the last century when Dean Herbert crossed *Nerine* species in order to obtain information for his treatise on the family Amaryllidaceae. It is fortunate that he used so many different species as his hybrids form the foundation of modern *Nerine* collections today.

His work was continued by H. J. Elwes, whose many hybrids are still in cultivation and although outmoded by newer clones, do contain some aneuploids and at least two triploids—'Lady Llewellyn' and 'Lady Sterling Maxwell'. After his death, half the Elwes collection was sold to Col. Stevenson-Clarke at Borde Hill in Sussex, where they still flower wonderfully each year cared for by Lady Clarke and her Head Gardener, Brian Doe.

Perhaps the most important collection is at Exbury near Southampton. It was built up by the late Mr. Lionel De Rothschild since 1930 who succeeded in breeding a remarkably wide range of different coloured hybrids of excellent form and quality. I have been fortunate enough to visit the collection in flower for the past few years and am constantly surprised by the remarkably high standard of all the seedlings. What is even more astonishing is that the whole collection has been achieved by making only 130 odd crosses. Over 20 named hybrids, many given awards of merit and one a first class certificate by the Royal Horticultural Society, were obtained from one cross alone—'Aerolite x Lionel'. Even more fascinating is the fact that these seedlings range from the white with a crimson tip of 'Coronation' and white with the pale pink edge of 'Jocelyn', through the deep salmon of 'Nell Gwynn' to the claret coloured 'Nelson'. I have both 'Aerolite' and 'Lionel' in my own collection and last Autumn with the help and guidance of Mr. LaCour, the eminent cytologist at the John Innes Institute, carried out a chromosome count on active root tips of 'Aerolite', only to find that it was a diploid ($2n=22$). Dr. Janaki Ammal has already published a count of 'Lionel' as being an aneuploid ($2n=24$).

The breeding of white Nerines has always been high on the agenda at Exbury and last Autumn Mr. Fred Wynniatt, the head gardener, had every cause to be proud of his latest successes. 'Vestal' had an enormous umbel and glittering flowers, white enough to make even the most ardent detergent manufacturer envious. 'Sacred Heart' from the same cross—'King of Belgiums' x 'Pure White'—was unfortunately not in flower. 'Wisley Bridesmaid' with rose pink flowers is quite outstanding and at last I have been able to add a bulb this year to my own collection.

Among the new seedlings flowering last year as yet un-named, a cross between ('Dolores' x 'Spitfire') has given some very attractive plants. This is the second season I have seen the seedlings from this cross in flower and this time there was a very fine salmon pink clone amongst them.

'Wellington Koo', the chance blue seedling responsible for so many of the unusual shades in the Exbury collection, is still turning out some very interesting seedlings. Two good mauves were from 'Carita' x 'Wellington Koo' and 'Wellington Koo' x 'Best Blue'. A good salmon pink with a darker line came from 'Pamela' x 'Caryatid' and a rather lovely white flushed pink from 'Chloe' x 'Snow Flake'. My own tiny offsets from these wonderful clones are slowly getting bigger and giving more flowers each year. On the breeding side I have concentrated more on attempting to cross Nerines with higher chromosome numbers and consequently have had a correspondingly high number of failures!

'Inchmery Kate' has obliged me with a small crop of seedlings using pollen from 'Ispahan', but I find these are very slow growing indeed.

This year we have had virtually no Summer in England to ripen the bulbs and even as I write in early August 'Mariloo' has decided that Autumn has arrived and is poking up flower buds.

*Graystead, Bovingdon,*
*Hertfordshire, England*

# 4. AMARYLLID CULTURE

[REGIONAL ADAPTATION, SOILS, FERTILIZATION, IRRIGATION, USE IN LANDSCAPE, DISEASE AND INSECT CONTROL, ETC.]

## AMARYLLIS REMINISCENCES

LEON BOSHOFF-MOSTERT

The cultivation of *Amaryllis* in South Africa during the past decade has assumed large proportions and it can be said to have developed into a major horticultural industry.

It is difficult to assess how much has been done in the direction of intensive endeavour towards the creation of more attractive types, colour breaks and departures from previous standards by the presentation of something ''new and different''.

To my knowledge, there are only a few of us, since the Buller era who harness our energies inclusively to this end. In each case we are not mass producers but, in the stricter sense of the word, devoted specialists to whom the wholesale distribution of commercial bulbs has never become an economic essential. During my visit to America I found this phenomenon to apply in an appreciable degree to the Iris world, in which the U. S. A. undoubtedly leads the field. In this sense I refer to the many outstanding specimens produced by fanciers in small private gardens.

A few years ago, through the medium of the Year Book, I urged members of your Amaryllis Societies to concentrate on this aspect since, from my personal observations in various States, success on show benches at that time could not be attributed to endeavour, but rather to acquisition. At the present time, however, it is clearly obvious that the States are well on the way in the right direction.

There is no doubt in my mind that the time is not far off when American bred *Amaryllis* will hold their own in any company. From what I have gathered, this tendency has developed rapidly, particularly in California. The same spirit is also actively permeating through South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana and Texas. American *Amaryllis* lovers owe a considerable debt of gratitude for the activities of and lead given by their countrymen whose names appear in the list of Herbert Medalists. All these names indicate great men of achievement and it would be presumptuous on my part to single out any one of them. I do feel, however, that my readers will agree with me when I say that, particularly in the ''Advance the Amaryllis'' campaign, Robert Goedert of Florida has earned our sincere good wishes for his continued success.

Reverting now to the Buller era, when this veteran was the King of Amaryllis in our fair land, only a negligible fraction of South African gardeners were then even aware of the existence of the *Amaryllis* which, at first sight, many would generally refer to as beautiful lilies. Therefore, when the wonderful opportunity came my way, I lost little time in popularizing this flower among domestic gardeners. I do not claim to have been the first here to offer *Amaryllis* to the public when I commercially introduced a comprehensive range of the cream of the Buller collection. There were already nurserymen who allotted a portion of their activities to *Amaryllis*—rather by way of a horticultural Cinderella share.

But as the pen is claimed to be mightier than the sword, I accepted this axiom by contributing articles with 'photos to horticultural journals and other publications. This brought invitations from the South African Broadcasting Corporation to deliver radio talks on the subject, which I gladly accepted as a means of furthering my Amaryllis advancement campaign.

I was determined to honour the undertakings given to Mr. Buller to carry out his work and, at the same time, to prove myself to be worthy of his confidence when he wrote in September, 1950, rather in prophetic vein that he could "see the day coming when Kleinskuur Amaryllis will be supreme in the land. If you carry on . . . I shall be happy to hear of your good work. I am near 80 years old and cannot go on much longer." Additional stimulation was not lacking, such as that "It will be great fun for you to see your first big batch of seedlings opening their first flowers."

With such continuous encouragement and assistance with a fount of detailed advice on culture, breeding and propagation, Mr. Buller not only inspired me to boldness to write those articles but also instilled in me an unabating enthusiasm for breeding. In all my work I was constantly mindful of the fact that in the plant world, as in all other fields of achievement where advancement is a continuous challenge, nothing remains static. The day could be foreseen when, what was then the coveted collection, could not remain so without progressive improvement.

To a large extent, in all modesty I feel that, although not beyond recognition, I have nevertheless improved on the Buller collection in many directions except the pure whites. Especially in the direction of bi-colours, polychromes and picotees, the collection has been much enriched. In blends and monochromes, both in pinks and reds, there is also a marked improvement, particularly in reds with which I have had gratifying results in the intensification and depth of colour. Here I think in particular of a deep cherry red with an overlay and veining of rose red. This one I have named 'Buller's Memory'.

Then there is 'Porcelain Belle' which is an outstanding blend of porcelain rose and venetian pink in large blooms majestically carried on proportionate scapes. In the same category can be placed 'Ida Eleonore', named for our second daughter. This is a blend of porcelain rose and begonia with a flush or overlay of geranium lake.

In the picotees I have had my full share of success. 'Lady Jane', of all things named for my devoted Cavalier King Charles Spaniel, is a white with a slight veining of claret rose towards the edges and a complete claret rose line around the entire bloom. 'Harlequin' is a blood red with white flushing towards the tips of the segs and distinctive veins and a picotee edge in currant red.

One of my best I have named for my esteemed friend and the well-known champion of the Amaryllis in Louisiana, namely, Louella Haydel. 'Mrs. Haydel' is a bi-colour picotee in geranium lake with white flushing and white central star. It is attractively framed in a pencil line of deep geranium lake. I could not think of any better way of paying tribute to this great lady for her charm, her unflagging enthusiasm and devotion to and infectious love of the Amaryllis.

In Mrs. Haydel's company I place 'Edith Myrle'—to my readers Mrs. Nahas of Sacramento, California, who, on behalf of the Mayor, presented my wife and myself with the Key of that Capital City. This is a white with vermilion tiger-markings and a blood red picotee all round. In spite of the delicacy of colouring and shading, it is a striking bloom which commands attention.

Another American lady to whom I wish to pay tribute is Mrs. Marie Fischer of Hinsdale, Illinois. 'Marie Fischer' is a currant red with a generous white flushing and overlay on the outer halves of the segs which are pin-pointed in currant red and completely framed in a deep currant red picotee.

'Hubert Fischer', although not a picotee, bears a strong resemblance to his wife. It is a cherry red with strong currant red influence and splashings of white towards the tips. 'Jan Hendrik', named for our youngest grand-son, is another striking bi-colour in crimson with a white central star and tiger-markings at the edges of the star. His sister Greta who is the eldest of our nine grand-children should have been grouped with the picotees, but for family ties is grouped in this paragraph. 'Greta' is an enlarged and improved 'Corpus Christi'. It is a white with claret rose pin-points and a pronounced picotee of the same colour in a darker shade.

Another exquisite bi-colour is 'Dazzler' which presents itself in orient red with a white flushing in the throat and along the inner halves of the midribs.

'Linette'—also named for a grand-daughter, ranks high among my polychromes. It is a fine and delicate bloom in dawn pink and empire rose beautifully set off against the white of its midribs.

These are all persistent four-bloomers which are proving that I am working along correct lines in my breeding schedule, a matter which Dr. Traub so kindly but emphatically stressed upon me during my visit to La Jolla about six years ago. The same was also confirmed by a substantial number of high-grade later varieties which bloomed for the first time this past season.

As a novelty, I am concentrating on green Amaryllis and have made encouraging progress in that direction. I am concentrating even harder—but not as a novelty—on breeding something equal to the best Buller whites such as 'Dallas Bride' and 'Avalanche'. I have not yet brought to light what I am looking for, but I shall persevere also in that direction.

In describing some of my successes, I do not wish to give the impression that I am laying claim to having out-moded the Buller creations. There are still some of his varieties, I am sincerely convinced, that will remain classics despite all claims and challenges.

During the past three years my health has left a lot to be desired. I was hospitalized for several spells and am still continuously under specialists' treatment. It is no exaggeration to say that over that period my effective labour output could not have been more than 50%, in consequence of which something perforce had to be neglected. As I have said in previous articles, my Amaryllis undertaking is a specialized one-man show where only routine unskilled activities can be entrusted to others, whilst administrative and executive responsibilities cannot be delegated. I am most fortunate, however, in having an outstandingly capable wife who relieves me of much of the supervisory as well as office work. This enabled me without interruption to keep up my breeding programme which at least suffered no set-back, whereas the commercial aspect had to be sacrificed. Luckily, my amaryllis concern is more a labour of love than a source of livelihood, otherwise we would by now have been on the dole!

I reluctantly refer to this somewhat personal aspect which is rather inappropriate in an epistle of this nature. It is done only for the purpose of conveying to the many correspondents the reason for my inability to respond to their enquiries for bulbs and price lists. Should the condition of my health continue to improve as it has done over recent months, I have every confidence that in the not too distant future I shall again be able to devote time to overseas enquiries and interests.

During each blooming season we have hundreds of visitors to Kleinskuur who are interested in Amaryllis as well as in my wife's Iris, Hemerocallis, Hostas, various varieties of Calla Lilies and other perennials. Among these visitors there is a fair number who, since they first acquired Amaryllis from me some ten or eleven years ago, have developed into discriminating fanciers. Year after year they regularly come to see what is new and to make selections from my latest would-be introductions. Some of these fanciers have by now also taken up hybridizing in which I have encouraged them. It is most difficult to refuse them even single off-sets of these selected hybrids before the mother bulbs go to incubation, with the result that it takes years before the would-be introductions can reach the catalogue stage. It has already happened that almost the entire incubator crop of such new hybrids were taken up at the year-old stage. This applies in particular to the new varieties previously described and their ''stable-mates'' which further adds to my difficulties in offering stocks for export.

In early September, 1965 I placed over 2,000 segments from many of my best varieties in the incubators in an endeavour to build up stocks to fulfill the needs of all my fancier clients and at the same time again to be of service to my overseas friends.

During recent years I have interested myself also in the *Crinum bulbispermum.* It was only after exploratory excursions that I found our region to be comparatively richly endowed as far as variety is concerned. I have found a range varying from pale pink, almost verging on white, to some very deep reds. Since these excursions into uncultivated fields do not entail exhaustive walks, my method is to stake steel plate markers next to those I select when in bloom, to make a rough sketch of the area and then to lift the bulbs in the dormant season. I have also gathered seeds from crosses made in the veld and am looking forward with great expectation to the blooms of my own seedlings.

The scope offered in the field of breeding will always remain unlimited and each decade—in fact each added year, contributes its share to a change in face and pattern. In conclusion, therefore, I wish to assume the role of moralist by expressing the view that it is not only the privilege but also the pleasant duty of each true lover of the Amaryllis to make her or his own personal contribution towards this never ending wonder. Be assured, the reward will be lasting joy and happiness!

## 1964 & 1965 AMARYLLIS SEASONS IN FLORIDA

Mrs. Fred Tebben, *Lake Hamilton, Florida*

The 1964 season of bloom opened with a lovely flower on my hybrid clivia, purchased many years ago from Houdyshel. It was a pretty thing, white with the upper one-fourth of each petal a deep orange, eight flowers on the scape. Buds began showing up in the borders in late February but no flowers appeared until March. On March 12th my husband and I took off for a Caribbean cruise which took us to Puerto Rico and to the Virgin Islands. I had hoped to see many amaryllis in bloom in the islands, but was much disappointed as I saw none anywhere there, but on our return to Miami I saw many beautiful blooms everywhere. One very impressive sight thrilled me there. Blooming all around a house were literally thousands of the orange-red variety with the greenish-yellow center spot which they tell me here is the original *Amaryllis belladonna* L. which grows so easily with no care or attention, and multiplies fast. I have a number of these but so far none have bloomed for me. There were many fine borders of *Amaryllis* x *johnsonii* too, and many throughout Miami that must have been Meade strain bulbs. All were so nice.

Returning home via the west coast of Florida, we stopped at Sarasota and had a nice visit with Dick Guerdan and saw his new place of business, and saw many fine orchids in bloom. Upon reaching home on March 22nd we found many amaryllis blooming here, among them 'Apple Blossom', 'Miss Margaret Truman' and 'Love's Desire'. There were several fine seedlings in bloom too, one much like 'Five Star General' and just as good, I'm sure. Next came 'Ludwig's Dazzler' and 'Doris Lillian' and then Picotee, which is very nice indeed. However, it seemed that some spots were empty where 'Bouquet' and 'Delilah' had been planted. They are two that do not like being planted in the borders, it seems. There were many fine Meade blooms and many seedlings that were nice but not outstanding. I feel very frustrated because I cannot identify any of my seedlings since they became badly mixed and labels lost when planted in the gardens of friends here in Florida when we were moving down from Illinois. Quite a number of Dutch bulbs did not bloom but I would certainly recommend 'Apple Blossom' for outdoor planting. It is really a fine performer, producing several scapes from each bulb and many new offset bulbs.

In July, 1964, my husband suffered a serious heart attack and was hospitalized for five weeks. He seemed to come along well, however, and we had a happy Christmas season with a visit from our son and from nieces and nephews from various places around the country.

Our winter of 1964-65 was a very mild one, and so the first amaryllis buds showed up in old *Amaryllis striata* var. *fulgida* by mid-February in the borders, as well as buds in the crinums. I purchased a number of the smaller sized bulbs and these bloomed well, but I was disappointed to find 'Rose Marie' and 'Aphrodite' were exactly alike, and must have been seedlings. There were many blooms everywhere among the borders. 'Happy Memory' was lovely, and so were dozens of other Dutch bulbs for this has been my best season of bloom so far. In 1962 Polly Anderson sent me some tiny seedlings from crosses made by Quinn Buck, and all of these bloomed. They were really outstanding, light reds and pinks, with lovely round blooms, and I felt thrilled to get blooms from seedlings in three years. Then, too, an old, old bulb bloomed again, 'American Beauty', purchased at least twenty years ago from the Cammack Growers at Maitland, Fla. This is a lovely cross between Dutch and Meade strains, and I am so glad to find I have this one still for the Cammacks sold their flower farm and went out of business many years ago.

My amaryllis notes end on April 4th, as my husband suffered a number of severe heart attacks and passed away on April 14th. I will remain here in Florida as long as I can find help to maintain this large yard and the borders. It is home here now and I love it even tho I shall be very lonely without Fred to be here with me. He loved it too, and enjoyed the four years of retirement he spent here.

## THE 1964—1965 AMARYLLIS SEASON

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### ADAPTATION IN AMARYLLIS

After several seasons of rather severe winters especially in the amaryllis belt of the south, this past winter was much milder. Amaryllis had a rather long growing season with enough moisture in the soil in the fall to encourage the bulbs to set a good crop of roots which helped to carry them through the winter in fine condition. Reports from all over the south this past spring were good. It appears to have been the best flowering season in many years. Old bulbs have recovered from their set back suffered during the past several cold winters. Exceptional flowers were reported and many are taking renewed interest after having been discouraged over the past several winters. This off and on interest is the story of amaryllis and I believe it comes from the belief that amaryllis are easy to grow while these same people might think orchids are hard to grow. Possibly the truth is that both are easy to grow if given the exact requirements they need; however orchids possibly have more of a universal requirement than amaryllis. Also orchids having more commercial value have received more attention. Much research on their culture has been accomplished. The orchid fancier goes to great lengths to provide exact conditions for his plants whereas the new amaryllis fancier does not. The new orchid hobbyist will perhaps acquire one or two plants, experience difficulty, and then at great expense and use of his time he will build a greenhouse exactly right for orchid culture. If by this time he has not lost his interest he is prepared to have success with his orchids. On the other hand someone seeing a beautiful amaryllis becomes extremely interested in this plant. He inquires about it and the owner of the amaryllis says ''Oh, there's nothing to it. I just bought a couple of bulbs, went out in the back yard, got a little dirt, set the pot on my window sill and Presto!—the tri-color in the show.'' The new fancier never asks the one who won the tricolor several years ago why he hasn't won it since or why he doesn't have any flowers in the show this year. He could advise the new enthusiast that it was just luck that he happened to give the bulb the exact condition it wanted that particular year and that at least half of its performance was determined by the attention it got during the growing season before; that the Lord had been kind to the Holland growers that particular season with an abundance of sunshine and good weather.

Had this new fancier asked one who had been through the bitter experience of failure, I am afraid he would have possibly received the same answer in just a little different way. It would have been something like this—Oh, yes, amaryllis are easy for me to grow. I won this Tricolor several years ago. Don't try anymore, you know, one should not be hoggish. He probably hasn't had a nice flower since he won the Tricolor. I don't know why amaryllis fanciers have this psychological block when the orchid grower does not. But until we amaryllis growers want to admit that amaryllis are as hard to grow as orchids if not harder we will prevent this flower from becoming as popular as it should be.

A number of people will disagree with me on this view. They will point out many cases that will give weight to the fact that I don't know what I am talking about. Amaryllis are really easy to grow. They will point out several beds in their neighborhood that perpetuate themselves and bloom abundantly each spring. They also will tell you that they too had such a bed at one time. So did I but they are gone now. Once they become really interested in the flower their luck runs out. The fact is he knows nothing about the requirements of amaryllis and when he becomes interested he notices that some of his did not flower each year. This he was going to correct. The more he did for them the poorer they flowered and finally he lost the bed.

I know where several of these beds of amaryllis in my neighbor are that flower each year with little or no care. I am afraid to approach the people who own the amaryllis as I know they believe it takes no special knowledge to grow them. If I said something to them they might dig the bed and replant them in another place in the yard and in a few years more or less they probably would lose every one of them.

I would like to tell you about three beds of amaryllis in my neighborhood and one bed of *A. belladonna albertii.* I asked the person who had this bed of beautiful *albertii* for just one or two bulbs. He immediately dug the clump of about 50 bulbs. He gave me half of them and he replanted the other half not 10 feet from the old bed. We lost all those bulbs within one year. Now, why did this happen? The fact is we both thought amaryllis were easy to grow and that all you had to do was stick them in the ground. We did not analyze the existing environment under which they were growing and although part of the bulbs were moved only ten feet they had an entirely new environment. It is my belief that we would also have lost them if we had replanted them at that time in the exact same spot.

*Amaryllis belladonna* will naturalize in peninsular Florida. However they often will perish if moved. I don't know all the answers to this problem but believe I have found some factors that are common to either success or failure by observing many naturalized clumps. These factors, I believe, can be applied to the hybrid amaryllis. These are applicable to the Florida area and should not be misinterpreted for use in other areas particularily those with little rainfall.

*A. belladonna* is considered to be evergreen; however, like most amaryllis in the tropics they more or less have a dormant season due usually to alternate dry and wet seasons rather than extreme changes in temperature. Whether the earth is in a cooling or warming cycle does however have some effect. I would like to point out that in the tropics although there is less change in temperature there are also two seasonal cycles a year where further south or north there is only one. In the tropics amaryllis therefore often flower in July and again in December during changes in these cycles.

Amaryllis in the wilds grow in various places . Many grow on rocks, stumps, or even in trees. Most of them grow where it is well drained especially during any dormant period or cold period. *Amaryllis belladonna* however will grow in muddy low areas in the tropics where the temperature is always above 70°F. but where night temperatures fall much below 70°F. it requires a dry area during low temperature levels and will rot easily if given a cool damp condition.

In the state of Florida where *A. belladonna* is found naturalized, generally a sandy soil exists. The summers are warm and damp; in winter there is less moisture and the springs usually very dry. Under these conditions *A. belladonna* will naturalize. The temperatures should not fall much below 50°F. for any long period of time and the soil should be relatively dry during cool periods. I would like to point out that *A. belladonna* possibly has the widest growing range in the wilds. Even it however is not found growing in abundance but only in small habitats or individual clumps. They grow in very limited areas in nature often not more than a few feet in area. This is because its requirements are more exacting than those of many other plants. In Florida one usually finds *A. belladonna* naturalized only in ground where moisture is exceptionally low during the winter season and moisture is most plentiful during the summer growing season. One may take exception to this as they will be found growing in flat low land that does not appear to be particularly well drained but this fact still remains a prime requirement and there are reasons for apparent exceptions. Usually after a clump of amaryllis is well established their root system can help take up excess amount of water and will grow in damper areas when newly set out plants will not. One might ask if this is true how did the clump ever get established. The answer is that the bulbs when originally planted were planted before or during an active growing cycle and got established before cool weather set in. Possibly if one would check further the winter following the original planting would prove to have been mild and dry which had helped considerably in the bulbs getting established. Other factors play a part. I have found that soil where *A. belladonna* is naturalized is often matted with tree roots. These roots absorb excess moisture. Amaryllis seem to like this condition and often do well at the base of trees where they compete with tree roots for moisture. The tree roots taking up moisture keep the soil dry during the winter which helps insulate the bulb from cold damage. *A. belladonna* is often found growing under the eves of houses where soil moisture is reduced. In most areas where I have found *A. belladonna* naturalized excess moisture in the soil is removed very rapidly after rains. Of course during the summer rains and the period of rapid growth there is an abundance of moisture for both the amaryllis and any root competition from the trees. Another factor that is important in the culture of amaryllis is that they do not like quick or sudden changes in soil temperatures. Most will do best where soil temperatures stay relatively the same. *A. belladonna* is particular in this respect and this is possibly the reason one finds it difficult to maintain this species in pots. The pot being small the soil changes much more in temperature during a day's time while the temperature of the open ground changes little. *A. belladonna* is often found growing in a protected area on the east side of houses which receives the early morning sun that keeps the temperature up during the winter.

Now back to the case of my friend who lost his *A. belladonna albertii*—his clump grew under the eve of his garage with an east exposure and the ground drained abruptly away from the building. He probably planted the original bulb in the spring after the weather had warmed up. It made good growth the first season and winters were possibly mild for several years until the clump was established. After the clump was established it could absorb excess moisture. Being under the eve of a building it received little moisture except with an east wind.

When the clump was dug it was replanted in the fall which was wrong. They were replanted in a poorly drained area and not against an east wall that could absorb a maximum of heat during winter days. So my friend lost his beautiful bed of *A. belladonna albertii.*

I believe we all can learn something from this experience. First, if you have a clump of amaryllis that is doing well, do not bother it or replant them until you have throughly determined why they do well there and can duplicate the environment. Even then you may fail. Amaryllis often will linger for years in a location under adverse conditions, then come forth with flower during some abnormal weather or other change in environment often lapsing back to a mere existence afterwards. Amaryllis do have exacting cultural requirements.

I would like to mention the three other clumps of amaryllis near my home that I spoke about. First is a bed of *A. x johnsonii* that grows on each side of a walk that leads to the front door of a small home. Along the walk on both sides are azaleas and there among the azaleas they grow and produce hundreds of spikes each year. Why they grow in this acid soil so well I do not know but *A.* x *johnsonii* appears to be tolerant to the acid soils in the south. A second clump grows not far away in a narrow space between azaleas and a drive way. These appear to be Nehrling hybrids and make a riot of beautiful airy orange red flowers each spring. They are possibly a hybrid between *A. belladonna* and *A. striata.* Another bed of Mead hybrids in a yard near a deep ditch makes an exceptional showing in my neighborhood. Generally the Mead's hybrids in Florida will grow in a wider range of soil conditions but as a rule where amaryllis are found naturalized in Florida they are *A. belladonna, A. striata* or a hybrid of these. These are much harder to transplant but in those rare cases where they find a suitable condition they grow and thrive with little attention if the environment is not changed. They do have exacting requirements.

Getting back to the past season the named Dutch varieties still demand the greatest interest among the hobbyists; however, there is more interest being shown for pot plants for home use and amaryllis as border plants. I feel the interesting show type flowers have been stressed too much by the American hobbyist to the detriment of the development of more vigorous types. The medium and miniature sizes for pot and border culture should be stressed more. A bulb can not support one or two huge spikes of flowers each year but could support a reasonable sized spike. Most complaints by customers are that their bulbs just do not flower each year or that they soon degenerate and rot away. But in spite of this they continue to buy the largest flowering sort in the catalog seldom realizing that many of these clones degenerate after they have flowered one or two seasons. *The public should seek and demand more vigorous clones.*

## BULB SIZES

With the increased interest in amaryllis purely for personal pleasure more amaryllis in smaller bulb sizes are being sold. The 22/24 cm size being about the smallest size that will flower as a rule. These can normally be purchased for about half the price of the 28/30 cm size. While the flowers they produce are normally small the first year these younger bulbs seem to establish themselves better with less care and less chance of decline has been observed. Of course for the show circuit the larger the bulb the more chance one has for obtaining that 1 in 1000 tri-color for the largest and best in the show.

## HYBRIDIZING

I think generally more people are interested in planting seed both for pot and border use. While most want seed from Dutch clones many realize that these crossed with select hybrids of other origins will produce superior plants as far as vigor is concerned. More of these special hybrids should be developed. The Dutch hybrids have a limited color range whereas by crossing them with other selected hybrids one can get an endless range of color tones. Crossing the Dutch on species and the Dutch on selected clones of other strains if properly picked can produce many new color shades. I would like here to tell about a few such crosses and what they produced. Others can be made that will be just as different and outstanding.

The first hybrid I would like to talk about is a cross made by Mr. Howard Cooper of Hawaii. He crossed the hybrid clone 'Floriade' on *A. aulica platypetala.* This cross produced some interesting seedlings. All favor each other generally being rather large with a white background with pin stripes or bands. They are exceptionally beautiful, different and of an airy form. This cross produced mostly shades of pink, salmon, orange and red. All look like kissing cousins and grow vigorously. These seedlings are all very late flowering like its seed parent, *A. aulica platypetala,* and come into flower a full month after the regular hybrid. Other color shades can be obtained by crosses of other colors of Dutch hybrids on *A. aulica platypetala.* By crossing it or any other selected clone or species with inbred Dutch hybrid clones you can very nearly set the color for the inbreed Dutch clone. The Dutch clones usually have little other color in them and the offspring normally will be a similar color blend of the Dutch clone used in the cross. Of course in crossing the Dutch clones on a species the form will generally be a blend of the two.

When one uses a select hybrid clone to cross with the inbred Dutch clones usually one can predict the color shading much more accurately than type or form of offsprings but neither can be predicted nearly as closely as when a species is used in a cross with an inbreed Dutch clone. To illustrate this I would like to comment on a cross I made several years ago the seedlings of which I flowered this spring.

I used a Tunia's Australian clone I obtained from India as the seed parent and a Dutch clone as pollen parent. I do not remember the specific pollen parent I used. There may have been several which is not really too important. The seed parent was a large rose colored flower with green on the mid-rib. The color reminded me of *A.* x *johnsonii* but of course the flower was much bigger at least 8″ and with wide segs. The seedlings produced from this cross with inbred Dutch clones had an exceptionally wide color range from pink, salmon, orange, rose to red. They have the greatest number of shades of color of any other hybrids I have seen. The form of the flowers were reasonably good. Many, about 10 to 20, rivaled the best Dutch hybrids. There were some of the most exceptionally fine brick rose and brick red shades I have seen. A good percentage of the flowers were solid colors of the Dutch or Leopoldii form. The others show some green or white on the mid-rib of reasonably good form. Many of the pinks are the lightest I have seen and the pink particularly show the wide flat form of *A. psittacina.* However few except pink show this form.

Those who observed these hybrids said they had not seen anything to rival them and they seem to be exceptionally vigorous and would make wonderful border plants as well as show flowers. I mention these two crosses as it points out what can be obtained by using a select hybrid clone or species and crossing with the inbreed Dutch clones.

## SELFING

Another interesting group of seedlings, I flowered this year, are self pollinated seedlings of this clone with three distinct characteristics; flower that has a faint picotee edge and some dotting. It is the most free flowering clone I have and therefore deserves my attention. The self pollinated seedlings of this clone have three distinct craracteristics. First the selfing produced some near whites with only a very slight trace of purplish red penciling. Some are rose and white and resemble the species *A. leopoldii,* at least the pictures I have seen of this species. The others range from nearly solid red with white tips on the petals. On those showing white generally the lower three segs were near white. A few were near duplications of the Dutch clone, 'Beacon'. By inbreeding these seedlings one or two more generations one could set, I believe, pure type and color and when crossed with inbred Dutch could predict the offsprings that would be reasonably similar in both color, form and growth. More work in this field is needed to develop good commercial garden and pot plant sorts at reasonable prices. A very interesting aspect of this is that further inbreeding of this particular clone could produce a duplicate of species *A. leopoldii.* My guess of the parentage of 'American Beauty' is ¼ *A. elegans,* ¼ *A. pardina and* ½ *A. leopoldii.* I believe new hybrids can be developed that are much superior to those on the market today and in this respect I would like to suggest several crosses that I feel would be especially good for Florida and the southern states.

## SUGGESTED CROSSES

Dutch clone x *A. aulica stenopetala: A. aulica stenopetala* is a fall bloomer and grows easily in the south, is reasonably resistant to insects and should make vigorous hybrids. It is a large flower type so you should expect large flowers.

Dutch clone x *A. striata* var. *striata* SA63-22: this species however is small or medium sized but is more vigorous growing and easiest to maintain in my area. *A. striata* matures fast and generally makes lots of offsets. This particular species has much more vigor and does not fall victim to Mosaic disease nearly as rapidly as other varieties of *A. striata.* It seems to tolerate more water also.

Dutch clone x *A. Reginae:* while *A. Reginae* is not a particularly good grower for me I can say I have fair success with it but to develop baby pink shades of amaryllis I feel this is the only one available that does not have orange or yellow in the red pigment in the segs and if crossed with white Dutch should produce pink seedlings. Let's see if my guess is right.

There are other crosses on selected hybrids one might want to make also with the species but the above species seem to be in my opinion best for using to develop hybrids for the south eastern states.

I will make one noteworthy exception. From about 2 months experience with A. cybister spectabilis I would like to predict that this species will be well adapted to this region and I feel can be naturalized in Florida and along the Gulf and Atlantic. It may prove to be a real find for hybridizing both for new forms and more vigor in our hybrids.

I would like to comment here that one might find other more acceptable species for breeding purposes in the more arid climates of California and the western states. Northerners may find some of the other species that like a much cooler growing temperature better for their particular area. I feel in this respect everyone interested in hybridizing amaryllis should try some of the species. You will find most of them difficult to grow but then one never knows when he will discover one very well adapted to his particular culture and region. The limits of color shades and forms in amaryllis have hardly been touched and one can develop his own personal likings in new hybrids that can not be purchased.

### NEW CLONES

In touching on the past season one can not neglect to comment on the new Dutch hybrid clones as well as those that have performed well for us for many years. One also must touch on the new clones from Africa. As the African clones are available first in the season I will make my remarks on them first.

### HADECO CLONES

Of the Hadeco African named clones 'Rosaline' still is the best performer. It is a fine amaryllis in white pin striped brick rose, the general appearance of light brick rose. Next popular of the older clones is 'Tangerine', a free flowering orange that can make 3 spikes from a 24 cm bulb. How this can be possible is hard to imagine but it often does this. The flower of this clone is reasonably large. It is a wonderful pot plant. Clone #65 is scarlet and is exceptionally free flowering. 'Rosedale' is a good turkey red or rose red. Clone #307 is a beautiful cardinal red that literally shines. 'Vintage' is the best dark red. Four outstanding new clones will appear next season. Best by far and one of the most beautiful orange colored amaryllis I have seen is 'El Torro', a most beautiful coppery orange that just reminds me of Spain and the colorful pageantry of the bull fight. 'El Picador' slightly darker, is also outstanding in the orange tones and one most collectors will not want to miss. Clone #242 is a large new pink and white striped and flushed clone that gives promise of becoming a good one in this color. 'Rubra' is another fine promising clone in camellia rose. The African amaryllis are popular for early flowers and the newer clones appear to be much improved. One can now get named clones in shades of red, rose, orange and white & red. A full line of colors will be available in the future.

### VAN MEEUWEN CLONES

The Van Meeuwen prepared amaryllis for early flowers which are available a month ahead of the regular stock are popular with many. This firm has been making rapid improvements in the quality of their clones both from the standpoint of perfection of flower as well as performance of bulbs. In recent years they have introduced many outstanding clones.

New this season is 'Bernice'. This is a very large tall growing dark red that is *fragrant*. It appears to be an improvement over their older 'Tristan'. It will become a leading dark red if not the leader in this field if its performance continues as good as it was in trials this past season. Look for this one to be the top dark red in coming seasons, a spectacular new one. New also this season is 'Queen of the Night', a very nice new dark red of regular form not as large as 'Bernice' but a fine one. 'Artemis', a new white flushed and striped rose red, is exceptionally tall and large flowering, a giant type.

I will try to name other outstanding clones from Van Meeuwen by performance. However I would like to say here that most of these listed here are also leaders in their color class in my opinion.

The most outstanding clone from Van Meeuwen is 'White Christmas'. It is most free flowering and extremely popular which it deserves. This is possibly the best white available for pot culture. 'Rembrandt' is one of the finest orange reds I have ever seen, large and easy to flower, very outstanding. 'Mars', a medium dark red is outstanding. This one appears to do exceptionally well in California. It is a very vigorous growing plant that reaches a height of 6 feet. 'Pygmalion' and 'Rose Marie' are exceptional free flowering whites, flushed pink, a color that is becoming very popular and these two are fine sister clones. 'Cupido' is a fine free flowering white and orange blend that grows large easily. The Van Meeuwen clones are among the most free-flowering for pot culture and those mentioned you will find to be exceptionally good.

### W. S. WARMENHOVEN CLONES

W. S. Warmenhoven has introduced several new clones in the past few years in the blends that are becoming most popular. Among these are 'Catherine Valenti', rose pink to dark rose and white; 'Mount Everest', pastel brick rose and white and 'Television', French rose and white. All three of these are similar except in a different shade of rose. All are worthy additions to any collection. Warmenhoven's 'Floriade' and 'Golden Triumphator' still remain popular in the blends and their popularity does not seem dented even by lower prices for similar clones.

'Bordeaux' and 'Moreno' are particularly good in dark rose and the only ones in this particular color. 'Violetta' in violet rose is still popular. 'Oasis' is still one of the top whites and a fine one. 'Beacon', 'Elvira', 'Armango', 'Little Diamond', 'Marion', 'Orange Wonder', Pink Beauty', 'Red Master' and 'Sweet Seventeen' all remain popular and are all outstanding clones.

### C. WARMENHOVEN CLONES

C. Warmenhoven, a small firm, furnishes some of the best red colored clones. Possibly the most beautiful red I have seen is 'Flamboyant'. This is of flat form and a most beautiful medium red color and texture. It is not easy to grow but to those who will take the extra care it can be outstanding. 'Red Champion' is a huge large medium red that is an excellent show flower. 'Top Score' is a fine medium red and 'Apollo' is a very good easy flowering orange red, C. Warmenhoven's new orange, 'Mrs. Warmenhoven', is an excellent new orange. This coming season they will introduce a new dark red, 'President Kennedy'. As this firm is known for its beautiful dark red clones this first one to be named should prove to be outstanding.

### LUDWIG & CO. CLONES

Ludwig & Co. in recent years has introduced some fine new clones in pink shades. These are much lighter than their previous introductions such as 'Pink Perfection' and 'Pink Favorite'. 'Dutch Belle', 'Heaven Sent' and 'Flora Queen' are all outstanding and a little different in shading. 'Flora Queen' has a lavender tone to it. Clone #101, not yet named, is as light but its color is not as clear. It, however, makes up for some of this by its vigorous growth. It is also a fine clone. 'Sight Show', just a little darker pink, is excellent and 'La Forest Morton' leads the pack in the rose pinks.

In whites Ludwig's 'Winter Carnival' is hard to beat. 'White Giant', 'Marie Goretti' are still among the best whites.

Ludwig's 'Home Decorator' in coppery salmon, 'Beautiful Lady' in rich medium salmon are good additions in this color. 'Bouquet' still is a leading clone in a lighter shade and 'Delilah' in tangerine orange is in a color class all of its own.

In salmon pink 'Spring Dream' and 'Prima Donna' are both outstanding.

In pink flushed whites 'Apple Blossom' and 'Love's Desire' are still popular but are finding competition from similar clones of other growers.

In the bi-tones 'Carousel' is outstanding. It makes late flowers of good quality to end the season. Not as striking as 'Five Star General' was at one time but it still is the best available.

The Picotee Clones—white with fine red edge—are extremely popular and beautiful. They are the most popular type today. Some difficulty with cultivation has been experienced with these but they are most worthy pot subjects.

In reds, Ludwig's new 'Red Coralin', a medium dark color appeared last year. It seems to be a good new red. 'Ludwig's It' in darker red is exceptionally good. 'Ludwig's Goliath' is a huge free flowering sort. It gave 9″ flowers on 24 cm bulbs last season.

'Streaking Stripes' is a fine white and green striped red variety that is *fragrant* and beautiful. It is a really fine amaryllis.

I nearly forgot to mention 'Trixie'. This is a most outstanding medium rose with fine flat form.

### CLONES OF OTHER BREEDERS

There are other clones that should be mentioned from other growers. 'Cavaliere' is a huge orange red of excellent quality. 'Day Dream' is a sensation in a blend of shrimp pink and white much like 'Margaret Rose' or 'Sweet Seventeen'. 'Flying Cloud' is an exceptionally free flowering white. 'Mohawk' of which about 25 bulbs were shipped to the United States several years ago was a sensation. Propagation difficulties kept this one from being available for several years. This coming season it will be available again. It is a giant dark red much like 'Red Master' except that it makes 4 flowers per spike and appears to be more vigorous. Bulbs of it will surely be in demand. 'Fair Lady', a blend of vermilion red, is different, beautiful and a fine one. 'Orange Orchid', a very beautiful new orange, is so bearded that it appears double at times. It is possibly the leading orange. 'Scarlet Leader' is a very free-flowering medium red and exceptionally fine clone that one can force easily.

### SPECIES

Before I leave you for another year I would like to touch on some of the species I have imported along with others I have had experience with. Possibly I may be able to help you identify some of the species that I have from time to time imported from South America and which you may have.

Species SA1-5. 1-60, 3-60, 4-60 and 6-60 and SA62-4 although all have not flowered, appear to be *A. aulica stenopetala.* This species grows vigorously in the south. The flowers vary in size from about 5″ to 8″ diameter and segs from ¼ to about 1″ wide. Segs are apple green about half way up their length with the outer portion light scarlet. The scarlet coloring varies in brightness quite a bit. This species sets seed poorly for me but I have self seeded it and crossed it with hybrids. It flowers in October-November and has an early summer dormant period. It has stood temperatures down to 25°F. when in full growth during the winter. Large bulbs are about 3″ in diameter. It grows well in community pots several to a six or eight inch pot preferably in peat but have also flowered them in pure coarse sand.

Species 12-62, which I sold for *A. blumenavia,* has flowered once. It grows rather poorly here, the flower was about 5″ crimson veined more deeply colored with a star in throat, rays between veins were green, flower was latterly compressed. This flower picked up light from the back side of the segs from moon light which causes the interior of the flower to glow. It is possibly pollinated by a night flying insect. This species is considered to be *A. correiensis compressa.*

Species 14-62 which was sold as *A. cybister* has been identified by Dr. Traub as *A. maracasa,* an orchid flowering type. It does not do well here; however, with cultural changes this season it is doing much better.

Species SA62-1 appears to be *A. espiritensis.* However the photograph sent along with SA2-2 appears to be this species. The tag on this lot was evidently mixed when collected. Flowers that bloomed for me have been porcelain rose with green white throat. I have just received a second batch of these which has just flowered. The bulbs are about 1¼″ to 1½″ in diameter. The flowers are small type *A. belladonna.* Some appear to be very much like a form that is sold is ''*A.* equestris'' in India and which Dr. Traub has named *Amaryllis mostertii.*

Lot SA62-2 appears to consist of at least two species. This batch of bulbs comes from Esperito Santo, Brazil. I believe the majority of these bulbs are *A. apertispatha* as flowered and photographed by Sam Caldwell of Nashville, Tennessee. He describes it as follows: Scape 18″ tall, 2 flowers open, flowers 6¼″ top to bottom, bottom segment narrowest of all, clear salmon with white and greenish center. Scape grew with spathe valve open from start. Spathe valve looked like two green leaves starting up and the flower buds were visible as soon as spathe pushed out of ground. This is undoubtedly *A. apertispatha.* Bulb was in good leaf at time of bloom. I dug mine in two seasons and lost the largest bulbs. One flowered. It was definitely of the *A. striata* alliance.

My collector sent a photograph of this species and it appears to be *A. espiritensis.* It appears that SA62-1 and SA62-2 were mixed when collected.

Species SA62-3 is considered to be *A. striata Crocata* but appears to be difficult to flower. I had several flowers the first season but none since. The flowers were large, up to 7″ across, very waved of light pink and yellow pastel color and very beautiful. The photograph furnished by the collector shows the same type. I will have to give this one more special care to get it to flower.

SA62-5 from reports and photographs sent me appears to be a form of *A. striata;* however, it has not been robust with me and I will have to change my culture in order to save this introduction.

Species SA62-6 appears to be a form of *A. striata* var. *striata* with flowers of intermediate size about 4″ to 5″ of reddish orange color. This species also does not grow well for me.

Species SA62-7 is the true species *A. blumenavia* with very small white striped lavender flower with up to 7 flowers per umbel.

Species SA63-11 turned out to be three different bulbs. One is a *Hymenocallis* with a semi-petioled leaf, and which makes four flowers per umbel, a nice evergreen type. The second is a *Crinum* of which I have no flower as yet, but Dr. Traub has flowered it and has named it *Crinum brasilense.* The third is an *Amaryllis* that has not flowered and the same area as SA63-12; from its growth it appears to be a form of *A. striata fulgida* like SA63-12.

Species SA63-12 is no doubt *A. striata fulgida.* It grew well the first year but like all *A. striata* gets too fleshy if over fertilized and many rotted in storage. I hope to again have flowering size bulbs to observe next season.

Species LM63-1 is from San Martin, Peru. It is *A. reginae.* There are some bulbs of a pink form among them. The flowers are identical except in color, the red fades to pink or light rose.

The above report covers most of the unidentified species I have collected which have flowered. At the present writing I have many that are making fine growth and hope I can report that these have flowered by next season. I am particularly waiting to see *A. cybister spectabilis* flower. I have one which has two spikes starting up at this time.

## AMARYLLID CULTURE IN THE PACIFIC NORTHWEST

Andrew H. Grubbs, *320 Robert Av., Richland, Washington*

Washington's Columbia Basin, east of the mountains, is far from an ideal spot for the growing of *Amaryllis* and other amaryllids. During the summer excessive heat and dryness prevail. In the winter short, very dark cloudy days have to be reckoned with.

For me these conditions are partly controlled and only a fair degree of success has been achieved; that is, some years have been very rewarding and some have been much less than satisfying. It is not unlikely that a well equipped greenhouse with automatic heating, cooling, ventilation and humidifying would provide excellent growing conditions, even here.

For hybrids of my own crosses I have been using the system of growing in out-door beds in summer and dry storing in winter. With some limitation this is a satisfactory substitute for a more adequate greenhouse. Limitations I have encountered are: a season of bad weather can result in no blooms or scattered blooming; an unexpected early freeze can cause damage, losses or total loss. I have not had any losses of my own from early freezing but I have often dug them when they could have benefitted from six to eight more weeks for growing and ripening had I not been afraid of early freezing. With a storage area that can not be kept cool many bulbs will put out buds in April and if they are not put in the bed within a week or two the buds will not open when they are planted out. The hazards to bulbs due to insects, diseases and other accidents are much greater in out-door beds than in the greenhouse.

My two major misfortunes were, first, rather heavy losses from the *Narcissus* bulb fly and later more devastating losses from the Mosaic disease. The *Narcissus* bulb fly is now under control. The bulbs are all soaked for ten minutes or longer in a solution containing one table spoon full of Aldrin in a gallon of water as explained in the ''Amaryllis Manual'' by H. P. Traub. Mosaic disease was first suspected from symptoms described in the same manual and was confirmed by sending some of the bulbs to Beltsville, Maryland where a study was being made by Doctor Robert P. Kahn. The result of the study was reported in ''Plant Life'' in 1963. Dr. Kahn reported the disease as Cucumber Mosaic Virus, a disease difficult to control on amaryllis grown out-doors because it is hosted by more than two hundred plants including many vegetables and weeds. I keep my beds as free of weeds as possible and spray as often as I can but unfortunately the beds are near the vegetable garden where tomatoes, cucumbers and beans are grown and I must dispose of every *amaryllis* that becomes marked as I suspect the plants mentioned are among the worst offenders as hosts.

Up to the present time, I have made about fifty crosses of *Amaryllis* using named Dutch clones, American hybrids, *A. evansiae, A.* x *johnsonii, A. belladonna* L., and making further crossings among the seedlings that resulted. The net result was a very pleasing display of flowers ranging from five to eight inches in diameter and in colors of red, orange and pink. There was a great variety of red shades, stripes, spots and borders. Most of these bulbs grew more easily than the Dutch hybrids, bloomed sooner while the bulbs were comparatively small. Many never did have bulbs as large as the Dutch hybrids and those that did have comparable size were among the least pleasing in color and shape.

It is probable that none of my clones was good enough, or different enough from clones already named and on the market to be introduced. I have never lived in an area where *Amaryllis* are common and I have never attended an Amaryllis show. All of my opinions hinge on the clones I have bought, pictures I have seen and information found in books and so it is probable that I am unable to judge properly just how good or different a clone is.

A large part of my collection was lost due to the mosaic and I do not know what those coming on will be like. If there is any lesson to be learned from my experience with mosaic, it is to not try to save any suspected clones. I was very reluctant to destroy any of my favorites before they were so badly marked that there could no longer be any doubt about their diseased condition. I was reluctant to destroy a good sized bulb that had not bloomed for fear it might be the unusual one I have been waiting for and so a source of infection was harbored where it could do the most harm.

I have numerous seedlings of crosses between *A. belladonna* L. and *A. evansiae.* These plants are in size, appearance and growth habit very much like *A. evansiae.* They do not seem to have acquired any hybrid vigor. When soil and drainage are not just right they are subject to root rot or the whole bulb may rot if the condition is not corrected. They will not grow out-doors in this locality. One of these bloomed early last spring. The flower was just like *A. belladonna* in size and shape. The color was a faded looking red, looking as if it had submerged stripes. The effect was not at all pleasing.

Crosses between *A.* x *johnsonii* and *A. evansiae* look and act just like those of *belladonna* X *evansiae.* None have bloomed yet. My methods of growing these may not be right. I have never tried letting them go dormant in the winter as they appear to be evergreen species. Perhaps they would benefit by a period of complete dormancy.

Eight seeds of the so called Blue Amaryllis, *Worsleya rayneri* were planted in 1957. All of them germinated easily and grew well for several months then I began losing them one at a time. I tried many different soils, fertilizers, temperatures and light variations. None of them did any good and I thought perhaps by trying too hard I was killing them with kindness and I let them alone with the same treatment the other plants were getting. One bulb survived and I put it in the out-door bed thinking Mother Nature might do something for it. In the fall I dug it and found it without roots and weaker than ever. It was again potted up in a four inch pot with plenty of drainage material at the bottom. A loose porous soil mix, to which was added a small amount of ground rock, and greensand and phosphate rock, and a pinch of trace elements. There is now some improvement. The neck of the bulb is five or six inches above the soil, the leaves are twelve or more inches long and fairly healthy looking. The bulb itself is probably about the size of a hickory nut.

Seed of *Amaryllis aulica* acted just like *Worsleya* except that they grew well from time to time and then a period of decline set in with losses until only one of these remains.

My latest addition is a bulb of *A, psittacina,* which has started off just like any other hybrid would and from appearances I do not expect any trouble with that one. It was planted this past autumn and already has an offset coming up beside the mother bulb.

Of other amaryllids I have tried to grow I will only make brief mention. Two *Hymenocallis* bulbs identified only as ''Spider Lilies'' grow like hybrid *Amaryllis* and the plants, when not in bloom, look just like *Amaryllis* among which they grow with the same care. When they bloomed they excited considerable interest and admiration because they were new and unusual to the people, who were seeing them for the first time. They interest me and sometime I will get some that are identified as to species.

For *Amaryllis* and amaryllids I have a shaded bed, about the same thing as a lath house. In this bed one bulb of *Lycoris squamigera* has grown for several years. It is winter hardy and has bloomed several times. This year it has set seed. I pollinized some florets with pollen from an *Amaryllis* that happened to be blooming but did not emasculate them nor screen them and so likely they were pollinated again by bees.

A *Crinum* 'Cecil Houdyshel' grows weakly and blooms half heartedly each year. It seems to be infected with mosaic but as it is away from the *Amaryllis* I have not destroyed it yet. The spots on it are less pronounced and not dark and waxy looking as are the blotches on some *Amaryllis.* Perhaps it is some climatic condition or cultural practice that it has not had time to adjust to.

*Nerine bowdenii* was tried in the greenhouse for three years with no success and now they are growing out of doors, where they seem to be winter hardy and they may in time establish themselves and give blooms.

Among seeds sent to me for trial here were: *Habranthus robustus, H. brachyandrus* and *H. texanus*. All of these were started from seed, grew easily and bloomed both in the greenhouse and out of doors, but only *H. texanus* seems to be reliably winter hardy. The others drop seed which will come up the following spring. I dig the bulbs in the fall and store them over winter. They are planted outside again in the spring.

Members of the genus *Rhodophiala* have not done very well in the greenhouse and most of them did not survive a winter outside. A few bulbs remain and I think they are *R.* x *huntiana.*

I can report real success with one other packet of seeds I received and that is *Littonia modesta,* a member of the climbing lily tribe. The seed grew easily and the bulbs or tubers multiply rapidly. Some left in the ground survived. Dropped seeds also come up in the spring. These in themselves are not especially desirable as an addition to the flower garden, but as was suggested they might be crossed with *Gloriosa* species, and this I may try when and if I get a chance.

## AMARYLLIDACEAE NEEDED FOR CELL DIVISION STUDIES *

Wm. T. Jackson,
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*Dartmouth College, Hanover, N. H.*

Endosperm cells contained in young seeds of the African Blood Lily (*Haemanthus katherinae* Baker) have been used for several years in cine-micrographic studies of cell division. The most complete description of the technique used in preparing endosperm cells for study is given by Mole-Bajer & Bajer (1963). The virtues of this particular species of *Haemanthus* for such studies can be summarized as follows:

1. The endosperm cells are suspended in a liquid in young seeds and the cells do not possess cell walls at this stage. Consequently, the cell-containing liquid can be squeezed from the cut seed onto an agar surface for easy microscopic examination.
2. If the excess liquid is drained from the agar surface the cells remain attached to the agar and flatten as surface tension of the liquid film covering them increases. Therefore, the chromosomes are spread into a monolayer during mitosis.
3. The cells undergo normal mitosis on the agar surface and the process is completed with a few hours. (It should be kept in mind that endosperm is a 3n tissue).
4. The nuclei are large (50 to 75 microns or even more in diameter).

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The haploid chromosome number is 9. The chromosomes are large (4 microns in diameter and up to 100 microns in length during anaphase). The thickness of the cell when flattened for study is 6 to 10 microns.

5. Relatively few starch grains are present in young seeds, thereby permitting precise studies of changes in birefringence with the polarizing microscope.

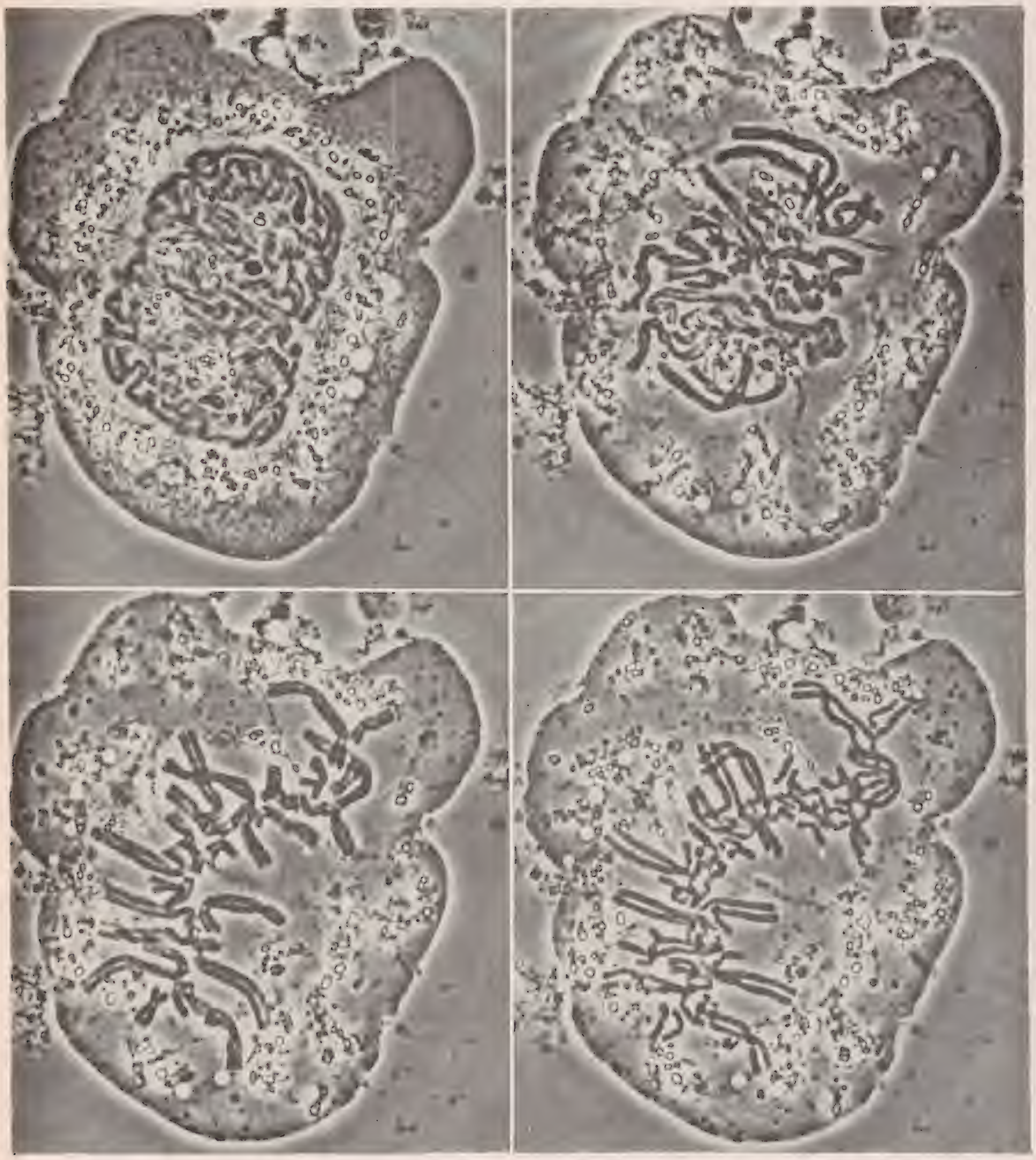

Fig. 21. Stages of mitosis in an endosperm cell of the Katherine's **Haemanthus** (**H. katherinae** Bak.) observed by phase contrast microscopy, **upper left**, prophase; **upper right**, prometaphase; **lower left**, metaphase; **lower right**, onset of anaphase.

**Time in minutes** from prophase; to prometaphase, **110**; from prophase to metaphase, **170**; from prophase to onset of anaphase, **190**. Continued in Fig. 22.

6. The cells will undergo division on a very simple medium (3.5% glucose + 0.5% purified agar is used routinely). However, at present, they will not continue to divide under these conditions.

7. A single seed usually contains several hundred cells in all stages of division. Therefore, one has ample opportunity to select particular stages for study.

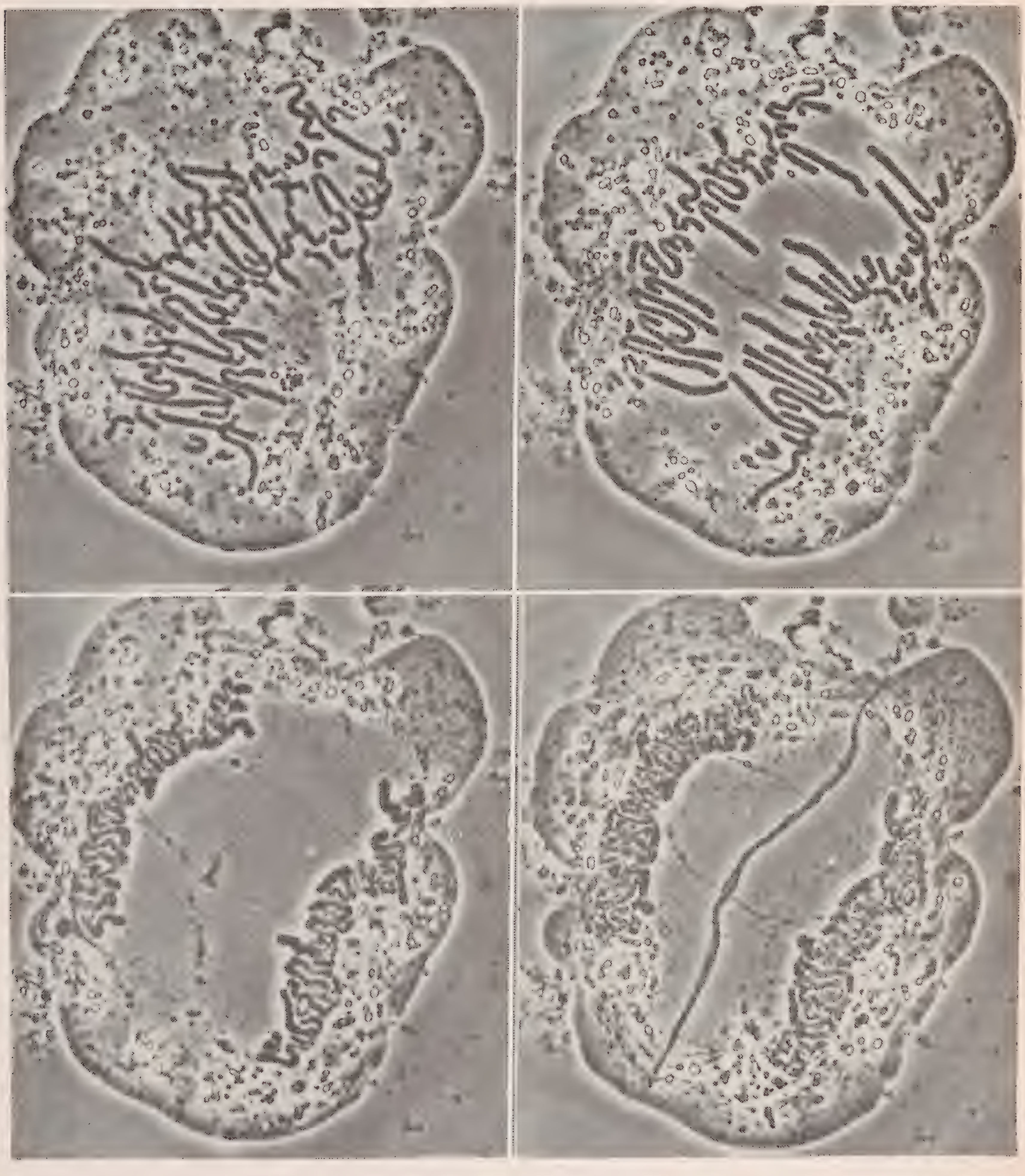

Fig. 22. Stages of mitosis in an endosperm cell of **Haemanthus katherine** Bak. (continued from Fig. 21) **Upper left**, mid anaphase; **upper right**, late anaphase; **lower left**; early telophase; and **lower right**, late telophase.

**Time in minutes** from **prophase** (in Fig. 21) to mid anaphase, **200**; from phophase to late anaphase, **220**; from prophase to early telophase, **240**; and from prophase to late telophase, **270**.

8. A single fruit contains one to three seeds, and a single plant of *Haemanthus katherinae* annually bears an inflorescence containing up to 100 single flowers. These fruits ripen over a three to five week period. Therefore, a single plant provides material for study for several weeks.

9. Although the plant normally flowers in the Northern Hemisphere during June and July, time of flowering can be controlled by holding the plant dormant or by breaking dormancy prematurely.

10. The plant is easily propagated from seed or offshoots, but it does require three to six years to reach maturity. In Europe, the plant is readily available commercially. It is less common in its native habitat of South Africa. It is not common in the United States, but it can be grown quite successfully outdoors in Southern California.

11. The plant, particularly the inflorescence, is striking and makes an excellent addition to a greenhouse. It requires very little care.

Unfortunately, very few species of plants have been examined for their suitability for *in vivo* cytological investigations. Of the species examined to date, members of the Amaryllidaceae have proven most promising. Therefore, we are undertaking an intensive examination of as many genera of this family as possible. We are most anxious to exchange mature bulbs, fruits, or seedlings of *Haemanthus katherinae* or *H. magnificus* for the same of other species.

If you are able and willing to send plant material (on an exchange basis or we will pay shipping charges), please send a *list* of material available to: Dr. Wm. T. Jackson, Department of Biological Sciences, 406 Gilman, Dartmouth College, Hanover, N. H. 03755 (U. S. A.)

The stages of mitosis in an endosperm cell of Katherine's *Haemanthus* (*H. katherinae* Bak.), observed by phase contrast microscopy are shown in Figs 21 and 22. Time in minutes:

prophase to prometaphase, 110
prophase to metaphase, 170
prophase to onset of anaphase, 190
prophase to mid anaphase, 200
prophase to late anaphase, 220
prophase to early telophase, 240
prophase to late telophase, 270

## LITERATURE CITED

Mole-Bajer, J. and A. Bajer Mitosis in endosperm: techniques of study *in vitro*. La Cellule 63(3): 400-407. 1963.

# ARTIFICIAL POLLINATION OF HAEMANTHUS KATHERINAE *

WM. T. JACKSON,
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Mole-Bajer and Bajer (1963) have emphasized for many years that the endosperm cells of several species of plants are suitable for *in vitro* studies of mitosis, and that the African Blood Lily (*Haemanthus katherinae* Baker) combines the most desirable characteristics of all species examined. During the so-called ''milk stage'' of endosperm development free nuclear and single cells without cell walls can be found. The chromosomes are large and identifiable, being about four microns in diameter and up to one hundred microns in length. Although endosperm is typically triploid, haploid (n=9) as well as polyploid cells are quite common. If a suspension of endosperm cells from the developing seed is spread on an agar surface (0.5% purified agar plus 3.5% glucose in glass distilled water) and enclosed in a saturated atmosphere, the cells will flatten spontaneously, and mitosis can be followed easily with the microscope (Bajer and Mole-Bajer, 1954, 1961, and Inoue and Bajer, 1961).

Even though cultivation of this plant began in 1877, it is rather uncommon in gardens and greenhouses and is becoming rare in its native habitat. Three to six years are reqiured to obtain a bulb of flowering size from seed or offshoots. The mature plant normally flowers only in late spring or early summer, thereby restricting the period during which young seeds can be used for studies of mitosis. Fruit set is so poor under natural conditions that an inflorescence containing as many as a hundred flowers may produce fewer than ten seeds.

We are attempting to determine the factors controlling (a) time of flowering and (b) fruit set. When this is accomplished, we should be able to space the time of flowering of a group of plants so that some will be in flower throughout the year and we should be able to control fruit set so that each inflorescence will provide a large supply of developing seeds. It is the purpose of this note to describe a simple, rapid, and highly effective pollination procedure that results in a high percentage of fruit set.

Mole-Bajer and Bajer (1963) recommend that the flowers be hand pollinated with a camel's hair brush. This is a tedious and time consuming process resulting in about 30% fruit set. A fruit that sets will contain one to three seeds. We have found that if one simply gathers together the flowers of the inflorescence with one hand, and rubs the heel of the other hand over the exposed anthers and stigmas, pollination is effected. A large collection of plants can be pollinated within only a few minutes, and cross pollination is insured. This procedure is repeated daily.

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* This work was supported by a grant from the National Science Foundation, GB 704.

Records were kept on nineteen plants growing and flowering in the greenhouse. The average number of flowers per inflorescence was 96 with a fruit set of 80%. The African Blood Lily possesses a trilocular fruit that contains only one seed per locule. Of the nearly 1300 fruits examined, 59% contained one seed, 34% two, and only 7% had a seed in each of the three locules. The first seeds in a given inflorescence reach the proper stage for study in about three weeks after anthesis begins, and the last is ready three weeks later. Therefore, a single plant will provide about 90 seeds spread over a three week study period.

### LITERATURE CITED

Bajer, A. and J. Mole-Bajer. 1954. Endosperm—material for the study on the physiology of cell division. Acta Soc. Bot. Poloniae 23,69-98. (plus 10 plates).

Bajer, A. and J. Mole-Bajer. 1961. UV-microbeam irradiation of chromosomes during mitosis in endosperm. Expt'l. Cell Research 25:251-267.

Inoúe, S. and A. Bajer. 1961. Birefringence in endosperm mitosis. Chromosoma (Berl.) 12:48-63.

Mole-Bajer, J. and A. Bajer. 1963. Mitosis in endosperm. La Cellule 63 (3):400-407. (with 3 plates).

## FURTHER NOTES ON USE OF CYGON

Prof. F. S. Morishita, of the University of California at Riverside, Calif., writes, under date of Aug. 11, 1964.— Cygon has been used quite regularly by many of the commercial nurserymen in southern California.

I would like to suggest that you try Cygon as a drench. This method seems to work the best for most people. The dosage would be 1:1600 (this would be about ½ teaspoon of Cygon 2.67 per gallon of water), also. a drop or two of some type of sticker-spreader should be added. Do not expect immediate results from this treatment. From our experience with this material used in this manner, we have found that it will take about three to four weeks before you start seeing some results. I think that it would be advisable to try this treatment on a few of your plants to see the phytotoxic effects of Cygon.

## AMARYLLIS FROM SEEDS UNDER ARTIFICIAL LIGHT

Richard J. Sudd, *750 South Cavan Lane,*
*Des Plaines, Ill. 60016*

The seeds of all *Amaryllis*, which I have secured, have given good germination under artificial light. The determining factor in most cases was the freshness of the seeds. The longer the seeds were kept in storage, the lower the rate of germination.

Over the years with the increasing number of *Amaryllis* bulbs, my growing area has become limited. Presently, I have some two hundred seedlings growing in an area 30″ by 40″ (thirty by forty inches), with two industrial fixtures overhead. I have tried to limit the growing area to seeds of a few crosses of the small flowering bulbs, and some of the species. In some instances it was possible to obtain flowering bulbs within two years.

All the seeds I have grown under artificial light are planted in plastic containers. The largest size of plastic container is cylindrical in shape, measuring 7″ in diameter with a depth of 5 inches. This container is sufficient for a dozen seedlings for two seasons' continuous growth.

Those seedlings which were not planted out of doors, were transplanted in individual cylindrical plastic containers for continuous growth under artificial light. These plastic containers measure 3″ in diameter and 6″ in depth.

The basic growing media used for seeds and transplanted seedlings was coarse sphagman moss and vermiculate. In the larger size of container for seeds, a 2″ (two inch) layer of coarse sphagnum moss was overlaid by a 2″ layer of vermiculate. The seeds were planted in the vermiculate to insure good germination.

Those seedlings, which were not transplanted out of doors after the second season under artificial light, were transplanted in individual containers. The same planting procedure was followed. as in the larger size container. The seedling root system was carefully surrounded by fresh sphagman moss, with the bulb resting on and surrounded by a layer of vermiculate.

I started a program of fertilizing when the seedlings put forth their leaf growth. A soluble fertilizer ''Hyponex'' (7-6-19) was alternated with muriate of potash every second week, and a temperature of 70 degrees was maintained in the growing area.

The light source has remained the same for seedlings as mature bulbs (see Plant Life 1964, pages 111-115). A minimum of twelve hours of artificial light at a height of twelve inches is given the seedlings the first year of growth. At the end of the second year, the height of the light source was increased to eighteen inches to allow further growth of the leaves.

I have not carried out any breeding program with any idea of creating new recombinations within the amaryllis hybrids. However, I do believe a change would be welcomed in the small flowering amaryllis, i.e. greater color variety. Probably working with *Amaryllis blumenavia* would be a step in the right direction, but as everyone with an interest in the field of breeding knows, obtaining a working stock is very difficult. I hope in the near future more of the new species will be made available.

# MORE ON GERMINATING AMARYLLIS SEEDS IN WATER

PHILIP G. CORLISS, M. D., *Arizona and California*

Until 1964 my plant originations (Spuria and Louisiana Iris, Hemerocallis, etc.) were introduced by other nurseries. Since it became necessary on account of my health to abandon my gardens in Arizona and to move my operations to San Diego, I put out a little catalog in 1964. My most successful efforts with amaryllis were in three lines: (1) doubles for field culture, (2) *A. striata* hybrids, and (3) a strain with a white picotee edge. I offered bulbs and seeds of these strains.

A customer from the southeast wrote me that she had poor germination with my amaryllis seeds, although she used procedure that had been previously successful. I sent her a replacement order and then decided to ascertain if something might have impaired the viability of my seeds, which had been shipped as soon as harvested and dried.

The method of germinating seeds in water as reported by Mr. Darold Decker in Plant Life (1964) appealed to me, since I would not be in constant residence in either Arizona or San Diego; and the inability to depend on caretakers to keep seed beds properly cared for during the vicious Arizona or the rain-free San Diego summers posed a problem. The gratifying results of my experience will, I hope, encourage others to use this method.

Having owned many cats for many years, I had acquired some years ago a rather extravagant number of clear plastic dishes offered as premiums by the Puss 'n Boots Company. These dishes are roughly 4½ inches in diameter and something under three inches in depth. The tightly fitting top section, which is about 1½ inches deep, overlaps the base section by ¼ inch. These dishes were washed with hot water and the lower section filled to a depth of ¾ inch with San Diego tap water.

In half the dishes I used a fungicidal powder provided by a leading chemical company. In the other half I used Lavoris (suggested by Mr. Decker) in amount sufficient to color the water a rather deep pink. Seeds were floated on the water to cover the entire surface but not to overlap. The Lavoris-treated dishes developed no mold, while most of those in which the powder was used became badly contaminated. In all "plantings" now I am using only Lavoris.

Germination of the amaryllis occurred in from ten days to ten weeks and was better than 50% despite the age of the seeds. The mortality of seedlings pricked out into flats and ferti-pots has been high, but that is due to my inexperience as a pot-grower, I am confident.

Having succeeded with the amaryllis. I am following Mr. Decker's suggestions to try other plant material. *Hemerocallis*, all kinds of iris, various amaryllids and irids, and even seeds of zapote and papaya are under test.

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# GROWING AMARYLLIDS IN NORTH FLORIDA

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*Jacksonville, Florida 32204*

Numerous correspondents throughout the country and readers of Plant Life have written to inquire how I raise my seedling *Amaryllis,* and in order to furnish this information most advantageously this article is being written to describe my methods in the North Florida area.

First, in June when the seeds are generally at their peak of ripeness, I gather them and plant one-quarter inch deep in a mixture of coarse sand and granular peat, in which has been previously mixed ground limestone, cottonseed meal and bone meal. Seeds may be planted flat, or on edge, whichever one may prefer, but it is important that they not be crowded and overlap each other, and the planting mixture should be firmed around the seed. Coarse bagging is placed over the seeds and a light watering is given with some soluble fertilizer solution. All seeds are planted in wooden flats. A good idea to make the flats last longer than one season is to soak them some time in advance of planting in used motor oil. This assures a strong and easily managed flat during all of the growing season, as well as assuring another season's use. Flats are placed on corrugated sheets beneath the benches in the greenhouse out of the direct sun, and very shortly the seeds sprout and make a vigorous growth. At this time the bagging is removed. Bulblets are kept growing in the flats through the remainder of the year, and until the next March, at which time each bulb has from three to five leaves, are the size of a marble, and are ready to plant out as individuals in separate pots. The pots are placed out of doors in shade during the summer months, and are brought back under cover in the fall. I use four-inch clay pots for the first transplanting and six-inch pots for the second transplanting after the bulbs have grown for two years. Six-inch pots will enable you to retain the growing bulbs for several years without further repotting. Plants may be kept growing much longer each season by continuing to bring them inside before cold weather starts.

Where large bulbs are dug out of the garden, or may be purchased in season. I start with a six or seven-inch clay pot. I make the soil mixture equal parts rotted leaf mold (woods soil) or granulated peat, topsoil from garden and sharp sand. Well rotted dairy or chicken litter fertilizer if available, or commercial sheep, and one good handful of bonemeal per pot, are added.

The bulb is set in the pot with roots well spread out, leaving neck and one-half of bulb outside of planting soil. Water with lukewarm water to settle soil. Keep inside house where pot will receive average heat of 70 degrees during day, and place near window to obtain some sunlight if possible. The inside heat will enable bulb to bloom sooner.

The bulb can continue to grow in the pot after blooming, but when warm weather comes, it should be taken out of doors, and the pot with

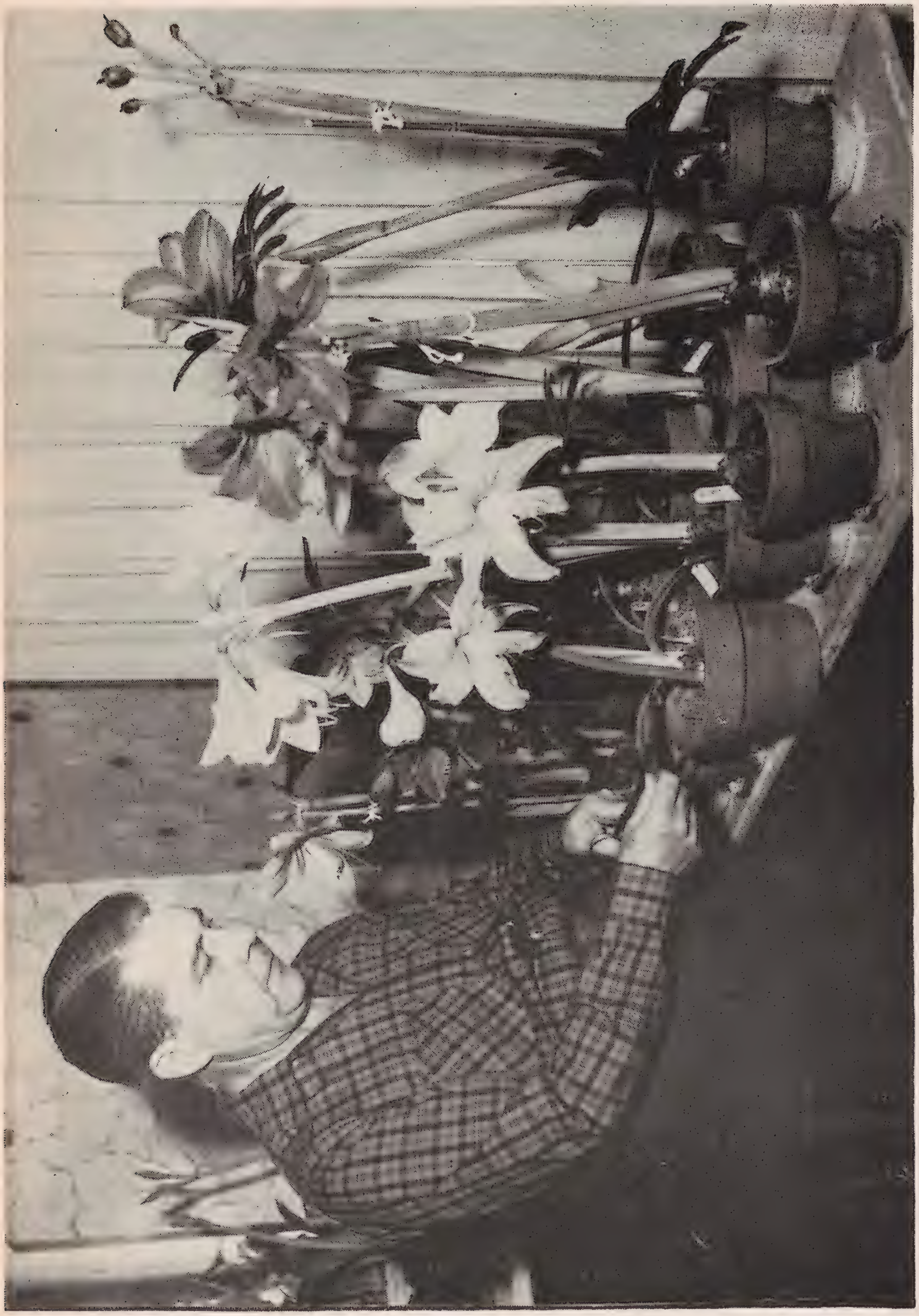

Fig. 23. Beckwith D. Smith, of Jacksonville, Florida, and some of his choice hybrid *Amaryllis*.

bulb in it sunk in the ground, where it can get sun and natural moisture that promotes root growth. Partial shade is best. Fertilize lightly and water lightly once a week during the spring and summer growing seasons It is necessary for leaves to grow, as well as roots, so the bulb can store up enough energy for next year's bloom.

While in the house, when leaves appear, turn the pot occasionally as the leaves will always try to lean toward the light outside. When bloom appears, tie bloomstalk lightly to bamboo or wooden stake for support. FEEDING: You may use any good soluble fertilizer or fish oil emulsion. OUTDOORS: Mix cottonseed meal or bonemeal in the outdoor planting soil.

Take up bulb in fall when leaves die down, bring inside and allow to dry off until ready to repot. Always preserve roots. Repot in fresh soil when ready to grow on in house, repeating the above cycle.

I am now growing seedlings from crosses made from blooms on the original A. C. Buller *Amaryllis* exhibited for the first time in U. S. at the Atlanta Flower Show, April, 1963. I hope that some of these will produce flowers of rare and distinguished beauty. Who knows? Perhaps they may.

## WORSLEYA RYANERI FROM SEEDS

Reports on the growing of *Worsleya rayneri* from seeds were included in the 1964 and 1965 issues of PLANT LIFE. Mr. Clouette presents his third report below. Others are requested to report their experiences with this difficult subject in future issues.

### 5. THIRD REPORT FROM MR. BURR CLOUETTE (CALIFORNIA)

Only one of my two seedlings from Dec. 20, 1962 survives. It is growing well and has always been quite thrifty. It is planted in Black Magic potting mix in a 4-inch plastic pot. The use of plastic pots seems advisable because *Worsleya* resents drying out. The bulb is now about ⅞-inch in diam., and is 1/3 out of the planting mix, the neck 3 inches long, and about ½-inch in diam. At present it has four mature leaves, and one just about 1-inch long emerging. The mature leaves are 6—8 inches long.

Of the five seedlings given me by Dr. Traub, four are surviving. Two are in my care and two are being grown on in the greenhouse by William Craig on the Campus of Southwestern University, San Diego, Calif.

The two I have vary greatly from the one that I raised, although they are approximately of the same age. One is slightly—over 1-inch in diam.—with a shorter neck 1½-inches long, and a neck-diameter of ⅝-inch. It carries seven leaves. The other is much smaller. The bulb is about ½-inch in diam., neck 2 inches long, and ¼-inch diameter. It has 4 smaller leaves. Both of these bulbs share a 5-inch plastic pot, containing Black Magic potting mix.

On April 21, 1965, I floated some *Worsleya* seeds on tap water. Twelve had germinated by May 20, 1965, and had leaves starting. As I was moving again, I transplanted them. Two did not contain chlorophyll and of course died. As of June 10, 1965, ten fine, thrifty seedlings are surviving, and some are already forming the second leaf.

# GROWING AMARYLLIS IN THE NORTH

JOHN J. SCHAEFER, *Dayton, Ohio*

Growing amaryllis in the northern states can be enjoyable and profitable depending on whether you are growing them as a hobby or as a means of livelihood. Of course, when I speak of *Amaryllis* I am referring only to the American species, which are sometimes erroneously listed under the synonym, ''Hippeastrum''.

*Amaryllis* growing presents quite different problems in the north than they do in the south, where they usually receive a more natural treatment depending on climate and soil. The closer one comes to a perfect climate and soil conditions the better. Since *Amaryllis* are not hardy here, one must protect them against cold by artificial means. This requires a greenhouse or a home. I have tried both.

In a greenhouse one can control the conditions quite well. Temperature and humidity can be controlled fairly well although the problem of air circulation is a difficult one. In the home it is still more difficult, since one must maintain, first of all, conditions more suitable to man himself than to his *Amaryllis.* The proper soil conditions may be obtained by selecting a suitable potting medium mixture formula.

In the Southeast the soil is usually loose, and porous, which permits the water to filter through at a fast pace. Porosity of the soil is important, and this importance can be noticed when one removes carefully a recently potted Amaryllis bulb from a clay pot and notices how the roots are mostly clinging to the sides of the pot to obtain air through the porous clay. I do not believe that I have ever read any reports of porosity tests with amaryllis, or any other flower, for that matter, but I do believe some reliable worker, with more space than I have available, should make tests to determine the value of porosity on amaryllis. The results may also have a bearing on the blooming and the fertilizing program.

Much of my young life was spent in a greenhouse, as my father was a florist. I learned to grow many flowers in a greenhouse, but none in a home. My father's first love was amaryllis, and I have inherited that love from him. When I left the greenhouse, the one thing I wanted to grow in my home was amaryllis, but growing flowers in a home is not like growing flowers in a greenhouse. I had heard many complaints of buyers who couldn't get their amaryllis to grow as we did in the greenhouse. I set out to determine what the problems were when growing amaryllis are grown in a home, so I planted many of the best bulbs available, that could be handled at home, (My wife still thinks I have too many, except when they're blooming,) and I have been raising too many ever since.

I found out that most people who grew amaryllis in the home did not pay attention to the exacting instructions given them with the bulbs. Every word written on the instruction sheet is important, or the space would not have been used to print it, and every little instruction disregarded has a bearing on the vigor with which amaryllis grow.

When my father was in business we used to ship amaryllis to Detroit, Michigan. All shipping was done while they were in bud, as amaryllis blooms bruise easily. Nowadays I never ship amaryllis as cut flowers in this city or any other. They were used in baskets, sprays and other funeral arrangements as well as pot plants. I mention this because the present is another time in which experimentation should be carried out by the commercial grower and florist on the shipping and use of amaryllis as cut flowers.

One more thought about amaryllis. NEVER call them lilies. My father would have reprimanded anyone who did so, and so will I. But you must try raising amaryllis in your home. AMARYLLIS ARE FUN.

## THE SANTA CATARINA ISLAND CRINUM MOOREI

L. S. Hannibal, *Fair Oaks, Calif.*

Several years ago Robert Goedert imported a number of Crinum from Santa Catarina Island off the coast of southern Brazil (City of Florianopolis, Ilha de Santa Catarina, State of Santa Catarina). To date five different bulbs have been released by number. Two turned out to be *powellii* hybrid types, one a *C. americanum* or *strictum* and the final #24 a *C. moorei* variation. Normally we would pass up reporting these plants but Claude W. Davis has found the Santa Catarina Island bulb better adapted to Gulf Coast conditions than the *moorei* forms normally in circulation. The blossoms have heavier substance and the root system is extremely vigorous. Previous to opening the blossoms have a faint odor of green walnut husk, and the seeds have longer radicles than a typical *moorei*. Otherwise there is no way to distinguish between the type and #24.

The writer was inclined to accept it as a new South African or South American form until he flowered a Drysdale hybrid between *C.* x *powellii album* and *C. moorei*. The similarity in flower substance and other habits now suggests that the Santa Catarina Island bulb is a F-2 or similar hybrid obtained by a *C.* x *powellii album* crossing on a *C. moorei*, a cross that could have occurred naturally under the humid conditions at Santa Catarina. The fact that other hybrids including two *powellii* turned up from this area may substantiate the conclusion.

Santa Catarina Island was a popular supply base during the days of the Clipper Ships and practically everyone passing around the Horn would stop there coming or going. Similarly, ships in the slave trade between Africa and Brazil often made this a port of call, so we still have the possibility of an African import, despite the fact that some wealthy estate owner may have imported a collection of Crinums from a Florida grower. It is hoped that the seedlings will disclose whether the plant is a hybrid. In the meanwhile it is a welcome addition to southern gardens where the common *moorei* flowers so poorly.

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PLANT LIFE LIBRARY—continued from page 70.

FLOWERS FOR THE KING: THE EXPEDITION OF RUIZ AND PAVON AND THE FLORA OF PERU, by A. R. Steele. Duke University Press, Durham, N. C. 1964. Pp. 378. Illus. $10.00. The first nine chapters of this interesting book are devoted to a brief sketch tracing the development of interest in plant science, including lineagics, in Spain during the 18th century, and to the telling of the story of the South American plant exploration trips of Ruiz and Pavon, and their French collaborator, Dombey. The remaining seven chapters deal with the until now unexplored subject of the partial publication of the projected "Flora of Peru". It was intended that this series should include the results of the South American expedition of Ruiz, Pavon and Dombey. However, due to the all too human behavier of Ruiz and Pavon and their contemporaries in Spain, France and England, only part of the results were published. It is a story that all interested in plant science must read as an object lesson, and Dr. Steele is to be congratulated on this important contribution to the history of lineagics. Most highly recommended.

OVERTURES TO BIOLOGY: THE SPECULATIONS OF THE 18th CENTURY NATURALISTS, by P. C. Ritterbush. Yale University Press, New Haven, Conn. 1964. Pp. 287 Illus. $7.50. The author explores the ideas of the 18th century naturalists on the basis of two beliefs: (1) that "electricity was the most important agent in the economy of nature, sustaining life and perhaps its principal physical cause", and (2) that plants were analagous to animals because of their close proximity in the scheme of nature". He explains the long delay in establishing *empirical* and experimental procedures as due mainly to such *deductive* reasoning. The author indicates that the empirical approach was first exhibited to a minimal degree by John Hunter (1728—1795), and some others. This contribution to the history of biology is required reading for all biologists.

CATALOGUE OF THE LIBRARY OF THE BRITISH MUSEUM (NATURAL HISTORY). London. Vols. 1—5 (1903—1915); Supplements, Vols. 6—8 (1922—1940). Facsimile Reprints. Verlag J. Cramer, Weinheim, Bergster., Germany. 1964. Price DM 672. At the British Museum (Natural History) there is maintained one of the great and most complete collections of books, including periodicals, manuscripts, maps and drawings pertaining to Natural History—Botany (plant science), zoology (animal science), geology and mineralogy. This reprint edition now makes this important author catalogue available to the many all over the world who cannot consult it personally in London. The Catalogue is especially valuable to students of natural history, and to bibliographers generally. Highly recommended.

HOLIDAY FLOWER ARRANGEMENTS REVISED, by Emma H. Cyphers. Hearthside Press, 381 Park Av., S., New York, N. Y. 10016. 1965. Pp. 129. Illus. $4.95. This revised edition of a well-known book on flower arrangements will be welcomed by homemakers. The subject matter is arranged by holidays—Thanksgiving, Christmas, Easter, etc.; and other occasions—as in the first edition. Highly recommended.

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# 1965 MEXICAN EXPLORATION TRIP

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As in previous years, the writer again invaded the interior of Mexico in search for new and rare bulb material. The first half of the trip was a repetition of the trip made in 1964, from San Antonio, Texas, to Mazatlan, Sinaloa, via Monterey and the city of Durango. My companion was again Chris Abee, a student, and we chose mid- to late July in order to pick up some of the later flowering plants. This proved to be a wise decision; it allowed us to find things in flower and in leaf that we might have missed had we been two weeks earlier. After leaving Mazatlan, we drove southward to Tepic and then turned eastward to Guadalajara, as before, but then we entered new territory (for us) when we made a loop southward to Manzanillo on the Pacific coast and returned to Guadalajara by way of Colima. From Guadalajara we drove northeastward to Leon, Guanajuato, and then turned southward again to Morelia, Michoacan, and then eastward to Toluca. From there we drove south to Taxco and Iguala before turning homeward by way of the Pan American Highway. The trip took ten days and covered more than 4000 miles. Except for one inevitable blown-out tire, we experienced no mechanical problems and everything went very smoothly.

We left Saturday afternoon of July 10, 1965, arriving at Laredo in time for supper and the usual customs inspection. By driving all night while still fresh, we were able to cover the many monotonous miles of the Coahuilan desert without boredom. Early morning found us in the state of Durango, nearing Durango City, where we would eat breakfast. This was fine for us, since it is here that bulbous plants begin to get more interesting. Unlike the previous July trip of 1964, the country was very dry with only evidence of widely scattered rainfall, and stockmen of the area were complaining of possibilities of drought if the rains did not come soon. Thus we missed seeing the *Hymenocallis* species that we had found in flower a few miles east of the city of Durango the year before. The lateness of the rains had kept them from coming up. No doubt that they were getting impatient at that late date. It really did not matter though, as my own collection of the previous year had grown well under cultivation, so there was no need to collect more. After breakfast we continued westward and found it still dry and looking more like autumn than midsummer. We were lucky in finding a little violet-blue *Nemastylis* species in flower and stopped to dig a few. These resembled *N. tenuis* of northern Mexico, but the latter is a late afternoon bloomer, and these were clearly morning bloomers. A few miles westward we stopped to search for the golden yellow *Tigridia dugesii.* Though we returned to the same spot in which we had found them flowering in abundance the year before, we con-

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sidered ourselves lucky to find a tiny number after much peering on hands and knees. None were in bloom and it was obvious that the drought had inhibited growth. We found a few other odds and ends here—a small lavender *Oxalis,* a glaucous-leaved *Bravoa* species in bud, a small pink stoloniferous *Allium,* some scattered *Milla biflora,* a small yellow *Anthericum,* and a quaint little *Tradescantia* with grassy leaves and tuberous roots. A bit later we stopped at a spot where we had found a colony of *Sprekelia* in flower the year before, along with a species of *Manfreda.* Not a leaf of *Sprekelia* was to be seen. A few *Manfreda* were peeping above ground.

It is painfully clear that the presence or absence of seasonal rainfall can determine the success of any plant collecting field trip. Fortunately a few more miles and hours of driving brought us into greener, wetter, cooler country. There we found *Tigridia violacea* once more, flowering abundantly in low wet places at 7000 feet elevation. The dainty spotted flowers may be almost white with faint mauve-blue spots, but most of them are darker mauve-blue with heavy ''freckles''. Unlike the *Tigridia pavonia* hybrids of our gardens, the outer segments of this little *Tigridia* are spotted as well as the ''cup'' formed by the interior smaller segments. I collected these again, as experience taught me that they withstand drying out poorly after digging, and losses are apt to be high if not kept damp and replanted as soon as possible.

Maybe we brought luck to the state of Durango, or at least rain, for the entire afternoon was spent driving in a series of various forms of moisture—fog, drizzle, sudden showers, sleet, and even hail. Certainly this high mountainous country had all the outward appearance of a bleak wintry day—in July! I was pretty certain that there would be no more collecting for that day, and it gave us a good excuse to make fast driving time through this country, just as it had the previous year. I understand that in winter one may run into sudden snow storms in these mountains. Indeed, we passed through an area that had just had a sleet storm, and the ground was so completely covered with sleet as to give the appearance of snow.

Later in the afternoon we began the gradual, but dizzying descent to slightly lower mountainous country as we entered into the state of Sinaloa, and ultimately the coastal City of Mazatlan, where we would spend the first night's rest. I had now been without sleep for about 33 hours, and had been driving for about 24 hours. Surprisingly, I was not tired yet, but one does begin to look forward to a hot bath and a good nights rest! At Kilometer 1186 we stopped long enough to collect a *Hymenocallis* species akin to *H. speciosa,* with several petioled leaves and a smallish bulb. This one we had collected last year in flower, but now these had mainly completed flowering and were in fruit. The identity of this one is still a mystery and it may turn out to be a new species. Growing with it was a bulb-irid of the *Tigridia* group, but they were not yet in flower so identification was not possible. We dug a few anyway. In the same area we found some beautifully colored giant *Echeverias* with light green leaves heavily flushed with red. I usually pass up succulents, but these were too choice to ignore. They are the largest species of *Echeveria* that I have encountered.

Dropping still lower in elevation into somewhat dryer country I found yet another species of *Hymenocallis* in leaf that I had overlooked the previous year. These were not yet in flower, but the broad glaucous leaves suggested a relationship to *H. choretis* and its allies. The finding of this type of *Hymenocallis* in this part of Mexico only served to puzzle me even more than I already had been. This now brought to a total of at least five different kinds of *Hymenocallis* to be found in the Durango-Sinaloa-Nayarit country and only seems to compound the problem of classifying them, rather than simplifying the matter. One wonders how many more species may be growing in adjacent country where there are no highways, waiting to be discovered?

The night in Mazatlan was pleasant and we had a delicious gourmet supper followed by much needed rest. Last year our trip southward through Sinaloa was dull because the country had not yet received any rains. This time the rains had been early and abundant and the country was cloaked in deep green with all kinds of roadside flowers in bloom. We found a *Hymenocallis* of the *horsmanii-repanda* group with linear glaucous leaves growing along mile after mile of roadside in low places. *Bessera* was growing in fair abundance in scattered colonies, but these were not yet in flower and we could not determine if they were the red kind or the violet forms. Not wishing to pass up any chances we collected them along with an unusually pretty dwarf *Oxalis* with large flowers in white or lavender. The three clover-like leaflets were unmarked and commonplace, but the flowers were larger than most and showier. We also found a plant that looked like a relative of *Bravoa,* but it was not yet in flower so we could not tell. Flowering along the roadside in low places was a little bulb irid akin to *Tigridia* in all shades of blue, purple, and white. Unlike *Tigridia,* these irids had the three larger segments curled upward and inward, as were the three smaller segments, suggesting a crumpled, globular effect. These little irids seemingly grew by the millions in Sinaloa and into the state of Nayarit. To be sure, we made it a point to collect these in all the various colors as they were quite showy.

Approaching Tepic, Nayarit, I spotted my first *Bessera elegans* in full flower. I could not hide my excitement when I discovered that in addition to the usual scarlet form, there were some beautiful carmine red kinds tinged with purplish-blue. I knew of these but this was my first experience at seeing them in full flower. Though of a darker coloring, they were every bit as showy and attractive as the coral-red forms. As they grew together, it was apparent that the carmine-red form was only a variation of the commoner coral-red *Bessera elegans* of our gardens. We also found a large colony of the lovely white *Tigridia passiflora* in flower and dug these also. Experience has shown that nearly every *Tigridia* species is worthy of superlatives when describing their fantastic form and beauty, but this one should rate near the top. The ivory white flowers are heavily spotted with gold, orange, brown, and purple. Larger than most of the miniature Tigridias, they can hold their own in any garden. We dug a sizeable number of these, but as luck would have it, the bulbs did not dry out enough and nearly all were lost by a fungus which grew on them and destroyed most of them. I was only able to salvage a few at journey's end. The same fate was awaited my collection of carmine *Bessera.*

After eating a late lunch in Tepic, we drove eastward toward Guadalajara, hoping to make it by dark. But our collecting fortunes were not over. A few miles east of Tepic we again found *Bessera* in profusion. The scarlet ones were obviously the dominant form, but scattered here and there were the lovely carmine forms in fair numbers, but best of all, I finally found my first of the violet forms. Perhaps the word ''violet'' is too pat. Actually they might be called violet-pink, and violet-blue. Some were obviously more pink or rose than anything else, with just a touch of violet or blue. Others were deeper rosy-purple strongly tipped with prussian blue as seen in *Lycoris sprengeri,* and some *L. squamigera.* Except for this peculiar coloring, they were similar in form to the other *Bessera.* For awhile it looked as if they were too rare for us to find any quantity, but suddenly we spotted a little colony on a small hill along the road in which the lavender-pink forms predominated, with only a few scatterings of the carmine and scarlet forms. At long last we could dig them in quantity. It is my belief that these *Bessera* will prove a welcome addition to this little group and should become as popular as the coral-red forms.

Towards evening we made our last collection for this, our second day, a beautiful terrestrial orchid of the genus *Stenorynchus.* The tall hyacinth-like spike is of a lovely shade of soft rose-pink with salmon overtones. The flower stem usually precedes the foliage, which soon follows in a rosette of broad ground-hugging habit. As the thick roots are of tuberous habit, they can be handled like bulb plants, though the brittle roots should be treated gently.

The hour grew late and it was quickly darkening. We decided not to drive on to Guadalajara but instead stay in the little town of Ixtlan del Rio, in Eastern Nayarit. This proved to be a good idea, as we found a brand new little hotel, clean and modern in every way, and very inexpensive. The beds and mattresses were new, the plumbing was new, and they had hot water! What more could one wish for? Since we always make these trips with the idea that we are plant collecting and not vacationing as leisurely tourists, we generally stay in second and third class hotels to pinch pennies. Sometimes they are surprisingly good, and sometimes they are pretty grim, with hard pillows, sagging beds, perpetually cold water, and faulty plumbing fixtures. Thankfully this little hotel gave us the best at the same low price. We were pleased. Alas, the town did not have any really decent restaurant to match the hotel, since this is not a tourist town, and we had to eat the familiar hot enchiladas stuffed with chicken and green chilis. Having little else to do, we strolled about the town to see if there was anything of interest. A small town, not catering to tourists, Ixtlan del Rio is very quiet, but we did find a small Fair in a residential area close to town. The only thing that seemed of interest was the Ferris Wheel. They must have thought that we were a couple of crazy tourists when we got on the thing for a spin. At least the view from the top was good!

The next morning we were at it again, digging up Mexico's roadsides. Our first stop found us examining *Hymenocallis* in bloom. These were the same as we had seen all day long the previous day. Some pretty white *Anthericums,* and some bulb irids in leaf grew with them. But what caught my eye was an odd little member of the spiderwort family that reminded me of ''Widow's Tear'' native to Texas. Unlike the deep blue ''Widow's Tears'', these were of an odd shade of coppery-tan color, and all three segments were of equal size and color. It looked as if it might prove a weed, but I collected it anyway. A species of *Tradescantia* grew alongside their copper-tan ''cousins'', and these flowered from a hyacinth-like spike. They impressed me as being the showiest of the ''spider-worts'' that I had seen.

Near the Nayarit-Jalisco state line we once again stopped to collect a few bulbs of an *Oxalis* species with huge 3-parted leaves, faintly banded with reddish brown and lightly pubescent over the entire surface. This species is easily the showiest and largest of the Mexican *Oxalis* that I have seen. The bulbs were unusually deep seated, making the digging difficult. The predominate color was deep purplish-rose but a few tended toward dark purple shades and others approached red. Casually it resembled the familiar *Oxalis Bowiei* (a frequently cultivated cousin from Africa) in size, coloring, and general appearance.

We stopped a few miles more down the road, after entering the state of Jalisco to dig some fine specimens of *Bessera elegans* flowering in company of *Milla biflora.* In the brilliant morning sunshine these *Bessera* were vividly scarlet, almost approaching orange in appearance.

We lunched in Guadalajara, but decided not to tarry as we still had a long trip ahead of us if we hoped to reach the Pacific coastal town of Manzanillo, in the state of Colima, by dark. The highway from Guadalajara to Manzanillo had only recently been paved and it now offered an opportunity to explore new areas for plants.

A few miles out of Guadalajara we stopped to collect *Oxalis tetraphylla,* a pretty little miniature with vivid rose-red flowers and many leaflets. A pretty violet-blue *Nemastylis* was just beginning to open in the early afternoon sun, and it appeared to be a form of *N. tenuis.* Apparently this dainty little bulb irid is fairly widespread over much of central and northern Mexico. *Milla biflora* was common here too, and we dug some especially fine forms with very broad segments. There were *Bessera* scattered about too, and these were a dazzling red-orange, the brightest in these shades we had yet seen. We found a few of the odd *Tigridia meleagris* scattered here and there, with their strange pendant bell-shaped blooms in plum and gold resembling the Fritillarias of northern gardens. We did not dig many, as the bulbs were very deeply entrenched in the hard black earth. Here too grew

*Calochortus*, but these things though widely distributed, are never common.

Near San Cayetaro I spotted *Hymenocallis* flowering in open grassy fields in very low wet places. We had some difficulty digging them out of the muck, and the soil had a sulphur-stench to it. So water logged was the ground that in certain spots the earth shifted and trembled under our footsteps, giving the same sensation of standing upright and attempting to walk in a small boat. The *Hymenocallis* were of the evergreen tropical type, with long swordlike leaves and pretty but undistinguished flowers of typical *Hymenocallis* form. The species was a new one to me, and though nice enough, it was not unusual enough to get excited about. A little later I did find something to get excited about though, when I spotted a large colony of *Bravoa geminiflora* in full bloom on a mountain curve. This was a fine compact growing form with orange-coral tubular bloom hanging loosely in pairs along the slender stem. The rosettes of narrow dark green leaves were prettily spotted with reddish purple at their bases. This being the largest colony I had yet seen, I was able to dig a nice supply of this little known relative of the cultivated tuberose.

At kilometer 1021, in southern Jalisco, I found in leaf what appeared to be a *Milla* of some sort. As none showed any evidence of flowering, I assumed that perhaps it belonged to that group of various *Milla* species that flower in the fall. I was able to flower one of these later on in my garden in September, but found it to be disappointingly similar to *Milla biflora.* Indeed I could see no differences at all, other than that it flowered later and the foliage was stiffly more upright. Only further study will solve this riddle. In this same spot we found a dwarf *Anthericum* species with tiny reflexed white flowers, opening in late afternoon. There were a few scattered Sprekelias with narrow glaucous leaves, but not in bloom, along with a bizarre member of the *Tradescantia* group with two broadly oval leaves hugging the ground.

Late in the afternoon we spotted some brilliant purple flowers on a mountainside and stopped to investigate. These proved to be a species of terrestrial orchid, perhaps *Bletia,* with tall spikes of large showy blooms. What appeared to be either a new *Bravoa* species, or a distinct form of *B. geminiflora* grew here too. These were not yet in flower, but the buds were showing enough color to indicate that they would likely be some shade of red. The foliage was unusually wide and flat, unspotted, and of a shiny light green color. These have done well under cultivation and it is hoped that they can be flowered in 1966 for comparison with the usual form of *B. geminiflora.* What appeared to be *Tigridia meleagris* were also in the bud stage, but these were difficult to dig because of growing so deeply. Bravoas, on the other hand, never grow deeply, but are just under the soil surface, making their digging a simple matter. Indeed, Bravoas resent being planted even so much as two inches deep and will immediately attempt to form a new bulb above the original one, just beneath the surface of the soil. In cultivation I have found that they like a rich well drained soil and plenty of moisture while growing. They seem to resent alkalinity, deep planting, and dryness.

The sun was beginning to set when we made our final stop in the mountains, to check out *Hymenocallis* in flower. These had broad glaucous foliage and were very close to *H. choretis* and its allies. The flowers were large, but had a rather small staminal cup. I dug these along with some species of *Manfreda* and *Tigridia,* neither of which were in flower, though a few *Bessera* were. We had no road markers to tell us our location, but we knew we were still in the mountains of southern Jalisco, perhaps an hour or so from the coast. By the time we reached the little coastal village of Barro de Navidad, we were tired, so we decided to stay there for the night rather than drive on to Manzanillo which was still about 40 miles down the coastal highway. We had never heard of this little town, but it was a beautiful out-of-the-way place that adventurous tourists dream of—a place to get away from other tourists. We gorged ourselves on local lobster before retiring to our hotel. Perhaps it was the lobster, perhaps it was something else, but Chris awoke in the middle of the night with nausea and abdominal cramps. Those lobsters did not stay down long and old chief Moctezuma had once more taken this revenge on another gringo tourist! I had plenty of various pills for the occasion but in order for them to work, one must be able to retain them long enough in one's stomach, in order for them to be absorbed and go to work. Chris's stomach and old Moctezuma were not about to allow this to happen. I spent the rest of the night listening to Chris's pathetic groans, desperately trying to get some sleep. I don't know how many times Chris had to get up during that night. I was glad to see the sun come up and left Chris, more dead than alive in restless sleep, in order to take a brisk morning walk to get waked up. I walked along the beach and it was beautiful—certainly every bit as pretty as Acapulco. I returned to the hotel room and with great effort managed to get Chris to his feet and into the car. I then began the long work of trying to salvage this hulk that remained of the ''Spanish quick step'' with the drugs at hand. First some tablets to control nausea, then a crossing of the fingers. They threatened to return but did not. Good! Then some antibiotics, followed by paregoric. Everything stayed down. Good! From then on it was a combination of paregoric, Kao-pectate, and antibiotics for the greater part of the day. Chris was feverish, and did not know what went on most of that day, sleeping the hours away. Old Moctezuma made a stab at me too, but like always, I had a relatively light discomfort, with an annoying belly ache which I managed to keep soothed with paregoric. I suppose some people develop immunities to these things in time.

I stopped at Manzanillo to eat breakfast, leaving Chris in the car asleep. Then I drove on to Colima on highway 110. This would complete the ''loop'' from Guadalajara to the coast and back. While driving in the mountains once again, a flash of yellow caught my eye and I stopped to investigate. It proved to be one of the real ''finds'' of the trip, a large flowered lemon-yellow irid allied to *Tigridia.* I have yet to get any kind of identification, but it seems to me to be a species of *Sphenostigma,* as the form is similar to the little white flowered *S. conzatti* that I found in the mountains of Oaxaca the year before. This yellow irid is unusually showy, as the color is one of those shades of yellow that fairly glows and the large flowers are nearly four inches broad! There are three long spreading segments and three smaller inner segments, all opening out flat, without any suggestion of a ''cup'' or hint of spotting. The foliage is in the tradition of *Tigridia pavonia,* being wide and pleated.

While digging these pretty yellow Irids I chanced to notice what appeared to be a robust sort of *Zephyranthes.* I dug a few bulbs and noted that several were ripening seed. Bulbs were typically of *Zephyranthes* size, and the seed pods were atop rather long pedicels. It suddenly dawned on me that these were not *Zephyranthes* at all, but a miniature *Sprekelia.* I had dug a few similar ones the evening before while collecting the fall blooming *Milla* species. As these too had glaucous leaves, I wondered if they might not be the same as the tiny *Sprekelia* species that I had collected in the mountains of Southern Puebla several years ago. Only time and more study will tell.

Just before reaching the city of Colima, I noticed a field of *Zephyranthes* in bloom and stopped. These turned out to be the only *Zephyranthes* that I found in bloom the entire trip and were familiar ones at that. I have collected this same species in Nayarit and Jalisco in other years. The majority of these were pink or white, but a few were deep rose-pink, almost rose-red in some individuals. There was a good deal of variation in form and size and I leisurely picked among them for the better forms. A little *Hymenocallis* growing with them caught my eye. One of the few true miniatures of the genus, I was impressed with the very narrow compact foliage of dark shiny green that lay close to the ground. A few were in flower or fruit and all scapes were either 1-2 flowered. The little bulbs were slightly more than an inch in diameter. Among the Mexican *Hymenocallis,* that I have seen, only *H. graminifolia* is as small, but it has prettier flowers than this Colima midget.

A little species of *Milla* grew here too in wet places and foliage was chive-like. None were showing any signs of flowering, so I assumed it must be another of the late blooming sorts. Judging from the density of the clumps and thickness of the colonies I judged it must seed freely and grow rampantly where conditions were wet enough for it. The corms were small as Millas go, and the chive-like leaves were glossy green and slightly flattened on one side. This is one species that will be closely watched until it flowers to find out just what it may be. It is such a weedly looking little thing that I can't see how a mousey plant can turn out to be very much! Maybe it is because it brought back old memories of collecting *Allium canadense* in Texas years ago. What a weed pest *that* one turned out to be! Never-the-less, I dug a goodly number of these *Milla* and crossed my fingers.

At mid-afternoon I spotted some purple *Tigridia* in flower along the roadside and stopped. Chris was still ''out'' cold. Indeed he even slept through a rough hail storm that I had driven through in the mountains an hour earlier! I dug these Tigridias and a few plants that looked as if they might be akin to *Bravoa,* but these were not in bloom. The Tigridias were quite pretty, with large violet segments banded with yellow at the point where the ''cup'' is formed. The three inner segments were darker purple and the cup was spotted purple. This plant was quite similar to another *Tigridia* found in Michoacan, but the lighter coloring, yellow banding, and overall refinement made it seem more appealing.

My final collection for that afternoon was made east of Jiquilpan, in a pine tree forest where grew another *Tigridia.* This one was in leaf only, but it was the only species of the group that I found growing in such heavy shade. About this time Chris woke up and it was obvious that he suddenly felt much better. He had been sleeping the entire day and was now obviously rested. Except for his nearly lifeless body reminding me of his presence, I might just as well have been traveling alone that day. It was nice to see that his illness had run its course and have him back among the living. This is not my first experience at having a traveling companion succumb to the Aztec curse in Mexico, so I am pretty well familiar with all its miseries. It is one of those things that every tenderfoot may as well expect and it is next to impossible to avoid. Generally an attack or two makes one immune. The main thing is to assure the victims that they will not die, even though they may wish to. It is one of those things that travelers joke about but it is not funny to the poor victim.

We spent a pleasant evening at Chapala, a lovely tourist resort on the banks of Lake Chapala. We were both famished and ate supper twice. We departed the following morning, passing through Guadalajara without stopping, as we anticipated a pretty busy day ahead of us. A few miles north of Tepatitlan I stopped to investigate a large field of a pretty yellow flowered tuberous rooted *Sisyrinchium.* These little irids are found over much of Mexico, but this was the largest colony I had yet seen. I dug a few of these and then noted a splash of purple nearby. A check showed it to be a colony of *Nemastylis* that was not familiar to me. These were of a rich purple color and of a nice form and size and growing from unusually small bulbs, being little larger than peas. Though close to *N. tenuis,* this little jewel was, if anything, even prettier, being more brightly colored and flowering early in the morning. *N. tenuis* does not open until warmed by the afternoon sun. After digging enough bulbs, I stopped to take color photographs of this remarkable island of *Nemastylis* within a sea of *Sisyrinchium.* It was a sight to behold, but a short lived one as the Sisyrinchiums were beginning to close. By the time we got back into the car all Sisyrinchiums had closed and they had seemingly vanished into the grassy landscape!

We did not collect any more bulbs that morning as we did not see anything that we did not already have. I was surprised to find a few *Bessera elegans* flowering along the roadside in chalky soil near San

Juan de los Lagos. I did not expect these things so far north in this part of the central Mexican plateau country. We ate lunch in Lagos de Moreno and then turned southward once again towards Leon, Guanajuato, where Mr. and Mrs. Clint had once told me of finding a pinkish-white *Bravoa* species among other things. As it turned out we did not have to travel that far to find them as they grew in fair numbers just outside of Lagos de Moreno. This was one of the plants that I had placed on my ''must find'' list when I planned this trip. At first glance it closely resembles the tuberose of our gardens *(Polianthes tuberosa)* and is obviously related to it. The flowers of these may be creamy-white, or white flushed with pink, or even light pink in some cases. Though quite fragrant, its scent is very different from *Polianthes tuberosa,* and the flowers are smaller. A thoroughly delightful plant, this little *Bravoa* (or *Polianthes?)* species deserves to be cultivated. We passed a man walking along the roadside with a knapsack over his shoulder in what must have been an armload of these *Bravoas* picked to be sold in the markets for cut flowers. It made me realize that this species may become rare indeed before long. All of Mexico is now being criss-crossed with the familiar barbed wire fences. Since livestock will no longer be allowed to roam and graze at will, overgrazing within fenced in lands will be inevitable and many rare plants will disappear. This leaves them clinging to the roadside right of way where they will make their last stand. The constant raids on the remaining Bravoas for cut flowers will allow few to ripen seed. The result of all this is easy to predict. Their problem is that they are being loved to death. Cattle love them and the natives love them, and this kind of loving is not good for the future of this species!

While digging these Bravoas I noted the many other bulbous odds and ends that the Clints had mentioned. We dug merrily like a pair of gophers. There was an unusually pretty *Anthericum* with low foliage and large showy glistening white blooms. Certainly this was as fine as any *Anthericum* I had ever seen. There were bright rose-red *Oxalis tetraphylla* that fairly glowed like rubies, so brilliant were they. Another *Oxalis* species grew there too, but this one had lavender blooms and slightly different foliage, though both species had those many extra leaflets that distinguished them from kinds with clover-like leaves. There were *Nemastylis* there too, likely *N. tenuis,* though we did not see flowers. A pretty yellow flowered *Cyclobothra (Calochortus)* grew with these other things. I had a field day and collected a bit of everything in sight.

It was a long trip down to Morelia, Michoacan, but we saw little else of botanical interest to delay us and we arrived at dusk. We spent the night in Morelia and left the following morning after breakfast. A few miles east of the city we stopped to climb a mountain that we had climbed the year before. On this mountain grew *Bravoa geminiflora, Zephyranthes, Milla biflora, Sprekelia,* a small white flowered *Oxalis,* and a dainty little tuberous rooted *Tradescantia.* For reasons hard to explain, we decided to climb to the top of this mountain. This we did and the view was magnificent! We also had the satisfaction of accomplishment which I guess is the motivation of mountain climbers. We rested long enough to admire a hawk of the genus *Buteo* soaring in leisurely circles below us and noted that only at an elevation such as this mountain top might one look down at flying birds.

Back on the road again, we drove through the rugged Michoacan mountains known as "Mil Cumbres" and it was a relief later to find some straight stretches of plateau country. At kilometer 221 we stopped to collect a purple *Tigridia* that grew in great abundance in mucky soil. Later in the afternoon, at kilometer 185, near Zitacuaro we stopped to collect from a thick colony of *Tigridia meleagris.* This species, with its pendent bells, has proved to be one of the easier ones under cultivation. Though not showy, the flowers are none-the-less very beautiful when seen at close range. Flower color is quite variable, but one form is yellow heavily spotted with plum purple on the exterior. The interior is white, spotted with purple and banded with ivory "glands" that reflect light like tiny sequins. It is one of those flowers that one is tempted to tear apart in order to fully appreciate. Growing with this *Tigridia* was that same mousey little *Milla* that weedily grows in ditches and other damp low spots that I first collected in Colima. These were not in flower either.

We arrived at Toluca, in the state of Mexico, at mid-afternoon and from there turned southward on highway 55 toward the state of Guererro, and Taxco, where we would spend the night. Nearing Taxco in the early evening, we stopped to collect *Milla magnifica* growing in great abundance in a rocky outcropping. This relatively new species has proved to be very amenable to cultivation and should become popular in time. I was anxious to get a hundred or so corms in order to build up a supply for introduction of this fine species. A flowering sized corm usually produces three hollow leaves resembling those of an onion, but often growing three to four feet in length. The scape may have 20-30 fragrant white flowers striped with green on the reverse. These seem to belong to a group of Millas which flower at their best after dark. We dug a few *Sprekelia* bulbs which grew alongside the Millas.

We spent the night in Taxco, and after doing a bit of shopping the following morning, we hit the road again towards Iguala and what would be the end of our field trip before turning homeward. A few miles south of Taxco we stopped to collect a few *Nemastylis* in leaf. I had collected some pretty white-flowered *Nemastylis* in this area the year before and I hoped that perhaps these too would turn out to be white ones. Most *Nemastylis* run to shades of blue, violet, or purple, so white ones make a welcome change. There is a beautiful yellow species that grows around Chilpancingo, also in the state of Guererro, but we did not go that far on this trip. I have a few of these yellow ones in cultivation and, like all *Nemastylis,* they seem to do very well under cutivation.

We drove south of Iguala about 30 miles to the southernmost point of our trip, where we hoped to recollect an unusual member of the *Milla* clan which we had found in flower the year before. There is a good possibility that this odd plant may turn out to be the long-lost *Diphalangium graminifolium.* The little white flowers grow in an *Allium*-like umbel and the segments recurve in the manner of *Cyclamen.* They seem to do well in cultivation, but they skipped blooming the first season after being collected. Indeed I find that nearly all members of the *Millinae* group will not flower the year following their collection while in active growth, but after that they bloom regularly. We found our plants easily enough and then turned homeward. With but a few exceptions, we now had nearly all the plants that we sought.

By late afternoon we were in Cuernavaca, and we made a brief detour towards Yautepec and Cuautla to recollect a tiny little *Milla* species that is closely allied to *M. biflora.* This one is undoubtedly a new species, and has characteristics that easily differentiate it from *M. biflora,* such as flowers with distinct pedicles, and numerous thread like leaves.

We stopped in Mexico City long enough to eat supper before driving on to Zimapan, on the Pan American highway, where we spent the night. The next morning we paused at Jacala to collect *Allium glandulosum,* a pretty wine colored stoloniferous species that flowers in the fall. We also dug a white-flowered *Zephyranthes* that grows just south of the city and these turned out to be our final excavations for that trip in Mexico. We then drove on to Laredo where our bulbs went through the usual inspection and fumigation ceremonies. Arriving home in San Antonio, I had the back breaking job of getting these plants back into the ground so that some of them could complete their growing cycle. Some of these resumed growing and a few things even flowered. Many will not flower until next year, while others will fail to appear at all. Nearly all survivors will be fully mature and should flower well in 1967. To be sure, not all collected plants survive the shock of being dug before they complete their growth cycle. Some will succumb to fumigation and others will fall prey to disease and soil parasites. Some may find our soil and/or our climate not to their liking and will gradually waste away. But the majority will adjust to cultivation and prove themselves worthy of all the effort spent in securing and pampering them. This then will be reward enough.

## NECTARIES IN ALSTROEMERIA PULCHELLA

HAMILTON P. TRAUB

Dichogamy in *Alstroemeria pulchra, A. haemantha,* and *A. pulchella* was reported by Traub in Herbertia 10:131—132. fig. 103. 1943. At that time no attempt was made to consider also the role of insects and/or humming birds in any mechanisms for cross-pollination.

The late E. O. Orpet had earlier crossed *Alstroemeria violacea* and *A. pelegrina alba,* and had obtained a fine hybrid which was named in honor of his wife, *Alstroemeria* x *orpetiae.* This is an outstanding purple-flowering hybrid, with large, wide-open flowers and is an excellent garden subject. In the second generation, some very beautiful white-flowering segregates appear in the Mendelian ratio of about 3 purple to 1 white, if a large number of seedlings are grown.

In the course of attempts in 1965 to cross *Alstroemeria pulchella* ♀ with *A.* x *orpetiae* ♂, the presence of nectaries was noted in the first named species but not in the latter.

As soon as the flowers of *Alstroemeria pulchella* open, the presence of copious nectar is noted. In each flower, the two upper petsegs (4.5 cm. long) only are in part functional as nectaries. The basal portions of the two petsegs are flattened, with sides in each one infolded and fused into a nectary with an opening at 1.7 cm. from the base. At this opening a relatively copious globule of clear sweet-tasting nectar is exuded. *A. pulchella* is a typical Brasilian species and it apparently depends on humming birds and possibly also insects for transferring pollen from one flower to another. *A. violacea* and *A. pelegrina alba,* are Chilean species and the pollinating agents are at present unknown.

# THE BLACK SURINAM-CHERRY, EUGENIA UNIFLORA

HAMILTON P. TRAUB

The usual red-fruited form of the Surinam-Cherry, *Eugenia uniflora* L., has long been grown in Florida as an ornamental shrub. However, the fruit as remembered by the present writer was not of high quality and was not relished due to a peculiar taste. Since the Second World War, a ''black''-fruited form has become popular in Florida. Several years ago the writer obtained seeds of this form from Florida, and it appears to be adapted to the coastal area of San Diego County, at least it has thrived in his garden in La Jolla, where it has made a fine medium-sized hedge to replace the usual too-vigorous *Eugenia paniculata* Banks, the Australian Bush-Cherry with undesirable fruits, which soon gets out of hand, and assumes the size of forest trees. Even the smaller-sized form is not satisfactory as a hedge.

The fruit of the Surinam-Cherry is red to very deep-red black in color, and the dessert quality, especially of the black form is delicious *when fully ripe.* This stage of ripeness can be determined when the fruits separate from the pedicels easily, leaving the pedicels on the shrub.

The Surinam-Cherry can be easily propagated from seeds and comes into bearing in two to three years. It would be desirable to select superior clones to be propagated vegetatively, but so far the rooting of cuttings has not met with success. However, this difficulty most likely can be overcome on further study.

# PLANT LIFE LIBRARY

ESSAYS ON CROP PLANT EVOLUTION, edited by Sir Joseph Hutchinson. Cambridge University Press, London. 1965. pp. 204. $9.50. Since the time of Alphonse DeCandolle's classical work, "Origin of cultivated plants", published in 1882, there have been few comprehensive studies of this important group of plants. DeCandolle's work on the origin of cultivated plants was followed by a long period of dormancy until it was revived and stimulated by the studies and explorations of Vavilov and his Russian colleagues shortly after World War I. During the past twenty years a flood of information about the origin and domestication of crop plants has accumulated. Unfortunately, much of this work is scattered through the literature, and is available only to specialists.

It seems doubtful that all that is known about the evolution of crop plants could be recorded in a single volume of reasonable length. Accordingly, "Essays on crop plant evolution" does not attempt to cover the entire field of domesticated crop plants; instead, a few of man's most important and diverse crop plants are selected for discussion by competent experts. The book is edited by Sir Joseph Hutchinson, and is based upon a series of lectures delivered at Cambridge University in 1962. The initial essay by Prof. H. Godwin, "The beginnings of agriculture in North West Europe", lays the groundwork for much of what follows. Sir Joseph makes a most successful attempt to give unity to the effort with a terminal essay, "Crop plant evolution: A general discussion." Sandwiched between these contributions are essays on maize (Mangelsdorf), sorghums (Doggett), temperate zone cereals (Bell), wheat (Riley), potatoes (Dodds), and forage grasses and legumes (Cooper).

In point of time, the crops treated are as diverse as wheat, domesticated about 7000 B. C., contrasted with some of the grass and forage legumes that are just now commencing to become cultivated plants (Cooper). The coverage is not so satisfactory. It is regretable that the book was not expanded to include an account of cotton to which Sir Joseph has made substantial contributions. Also, it is curious why rice was omitted from the discussion. Here is a crop plant which provides nearly the entire caloric intake of millions of people in the less developed countries, and its evolution has been thoroughly investigated. Given the limitations of space, however, it is doubtful if a list compiled by any two people would be identical.

Except for scope it is difficult to find fault with this well-written book. Each contributor has handled his material in comprehensive, but interesting fashion, and it would be unfair to comment favorably on one essay over the other. Nevertheless, this reviewer cannot refrain from commending the discussion of the "Evolution of Maize". Mangelsdorf has told the maize story in flawless fashion. Some new and critical data have been added from his own research along with several of Galinat's magnificent diagrams of maize morphology. Maize historians who choose to disagree with all or portions of Mangelsdorf ideas on the origin of this crop will have to come-up with some significant data to support theories other than those proposed in this essay.

Mangelsdorf presents a compelling argument to show that the tunicate gene (tu), with its system of modifiers and strong pleiotropic effects, was largely responsible for influencing the direction of maize evolution once maize became a cultivated plant. Thus indirectly all indigenous civilizations of the Americas were dependent upon a single locus of chromosome 4 for their development. In much the same way what is known as Western civilization was dependent for its development upon the diploidization of polyploid wheats. In a beautiful series of experiments Riley and his co-workers have shown that a mutation at the pairing locus of chromosome V has "imposed a diploid-like meiotic regime" upon tetraploid and hexoploid wheats. As a result, the polyploid wheats have a stable genotype, are highly fertile and immensely productive, essential requirements for a successful, cultivated seed crop.

The book has an adequate bibliography, a good index, and is relatively free of irritating typographical errors.—*Thomas W. Whitaker*

AGRICULTURAL GENETICS, by James L. Brewbaker. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 1964. pp. 156. $4.95. The audience for which this small book of 156 pages is intended is not immediately apparent. Neither the remarks of the editors or the author's Preface are helpful in suggesting an appropriate niche for the book. Judging from its content the book could be used as an adjunct to a course in plant or animal breeding, or possibly as supplementary reading for graduate students in the agricultural sciences. To be read with understanding, however, some background in genetics and cytology, along with an elementary knowledge of statistics will surely be needed.

According to the Editors, the aim of the Foundation of Modern Genetics series is to provide a stimulating, selective account of certain areas of genetics. In compliance with this directive Brewbaker has discussed a number of aspects of genetics important in agriculture such as polygenic inheritance, genotype-environment reactions, host-parasite relationships, polyploidy, genetic lethals, breeding systems, mutation, and others. Obviously, with a great number of topics to be treated in limited space, not all could be explored in depth. Furthermore, a broad treatment of each topic would have forced the author to infringe upon the territory of his colleagues who have prepared books in this series on Gene Action, Population Genetics and Evolution, and other subjects germane to agricultural genetics.

Like most successful texts in genetics a list of problems (usually 4 or 5) terminates each chapter. Evidently for the purpose of conserving space, references are to general works rather than to original papers. This can be a source of annoyance and frustration for the inquisitive student and investigator.

To the uninitiated some of the examples used to illustrate certain phenomena are likely to be more confusing than enlightening. For instance, in discussing Stakman's classical work with physiological races of wheat rust, the data cited are for races of wheat *bunt* rather than races of *rust.* No explanation is offered for the sudden switch between rust and bunt.

The book is never dull, and is not overburdened with technical jargon. Brewbaker writes clearly and concisely, and he is adept at coining sharply worded phrases. There are several noticable grammatical lapses and a few typographical errors. These could have been eliminated with better editing. There is an index of 4 pages; one error was detected in a sample of 10 items. The faults are mostly of a minor nature and in the opinion of this reviewer the book will achieve its objective of stimulating the thoughtful reader to take a close look at the fasicinating genetic problems of modern agriculture.—*Thomas W. Whitaker.*

PLANT HYBRIDIZATION BEFORE MENDEL, by H. F. Roberts. Hafner Publishing Company, New York and London. 1965. 374 pp. $6.75. The Hafner Publishing Company deserves the thanks of plant breeders, plant geneticists, and indeed all biologists for reprinting "Plant Hybridization Before Mendel". Originally published in 1929, the first edition has long been out of print. In the intervening years Roberts' book has become a classic for the period it covers. Plant breeders and plant geneticists with an interest in the historical development of their discipline will welcome an opportunity to consult this standard reference on hybridization prior to 1900. Except for some of the illustrations the book is neatly reproduced, fully the equivalent of the original.

Roberts lets the early hybridizers tell their own story. This system, using long quotations interspersed with narrative, can be both good and bad depending upon the skill of the investigator in describing his observations and experiments. At times it is intensely interesting, but on the whole it tends to be dull reading. This comment, however, is not intended to reflect upon the usefulness of the book as a reference source.—*Thomas W. Whitaker.*

KURZE GESCHICHTE DER GENETIK BIS ZUR WIEDERENTDECKUNG DER VERERBUNGSREGELN GREGOR MENDELS. 2 Auflage. [A short history of genetics up to the rediscovery of Gregor Mendel's laws. Second Edition.] by Hans Stubbe, Gatersleben. Veb Gustav Fischer, Verlag, Jena. 1965. Illus. The first edition of this book published in 1963 was reviewed in Plant Life Vol. 20 (1964).

The new edition published in 1965 is essentially identical with the first edition, except the second edition has been increased by 40 pages over the earler edition.

The new material consists mostly of a facsimile reproduction of Mendel's famous letter to Carl von Nägeli, and the addition of the portraits of 5 distinguished investigators, the best known being William Bateson. It would have been helpful if a German printing of Mendel's letter had accompanied the facsimile reproduction. Only an expert could decipher the combination of German script and Mendel's handwriting.

Portions of some chapters have been rewritten to include new material but the original text remains largely unaltered. This book is one of the best accounts of the history of genetics up to 1900. Its usefulness and popularity would undoubtedly expand if a good English translation were available.—*Thomas W. Whitaker.*

FERTILIZATION, by C. R. Austin. Prentice-Hall, Englewood Cliffs, N. J. 07632. 1965. Pp. 145. Illus. Cloth bound. $4.95; paperback, $2.95. This stimulating new text dealing with general knowledge about fertilization in organisms is intended primarily for students and research workers. Chapter 1 is concerned with general cytology as a basic cellular background for the rest of the discussions. The other chapter headings are: significance of fertilization; form and differentiation of gametes; approximation of gametes; contact and fusion of gametes; immediate consequences of fertilization; and unusual and abnormal forms of fertilization. This excellent text is highly recommended.

PLANT PATENTS, WITH COMMON NAMES, 1964 SUPPLEMENT, 2337 THROUGH 2464. Publ. by the Amer. Assoc. of Nurserymen, 835 Southern Bldg. Washington, D. C. 20005. Pp. 7. $0.50. This is a supplement to the listings of plant patents previously published. The subject matter is arranged under three parts: I. Numerical listings; II. Alphabetical listing under common names; and III. Alphabetical listings of names and addresses of originators or discoverers and assignees.

THE JOYS OF GERANIUMS, by Helen Van Pelt Wilson. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016. 1965. Pp. 364. Illus. $6.95. This is a revised and enlarged edition of the well-known book on geraniums (pelargoniums) with which the readers are already familiar. It is a guide to the species and named clones, propagation by cuttings, breeding and culture, including the control of pests and diseases. Recommended to all interested in geraniums.

IT'S YOUR COMMUNITY, by H. B. Raymore and H. S. Ortloff. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016, 1965. Pp. 240. $3.95. Subtitled, "A Guide to Civic Development and Beautification", the objective of this new book is to provide a background for the "maintenance of beauty and fitness in our surroundings." Among the topics covered are "call for action", urban patterns, the modern American community, traffic and parking, open spaces, street trees, roadside beautification, local planning and zoning, urban renewal, organization of projects, etc. Recommended to all interested in civic improvement.

THE FLOWER ARRANGEMENT CALENDAR, 1966, by Helen Van Pelt Wilson. M. Barrows & Co., 425 Park Av. S., New York, N. Y. 10016. 1965. Paper with plastic ring binding. Illus. $1.50. The publisher sponsors an annual flower arrangement calendar contest In this little book, the 20th edition, some of the outstanding photographs of floral arrangements accepted by the publisher are reproduced in calendar form for 1966. This calendar will interest those engaged in flower arranging.

NATIVE WILD PLANTS OF NORTHEASTERN UNITED STATES AND EASTERN CANADA, by F. H. Montgomery. Frederick Warne & Co., 101 5th Av., New York, N. Y. 10003. 1965. Pp. 193. Illus. $3.95. This book is designed for those who desire an intermediate guide that provides more than casual acquaintance with the native flora. The book is profusely illustrated with line drawings and some color plates. Following the key, the wild flowers, under common and scientific names, commonly found in the areas indicated in the title, are very briefly described. Recommended to all interested in native American plants.

WEEDS OF THE NORTHERN UNITED STATES AND CANADA, by F. H. Montgomery. Frederick Warne & Co., 101 5th Av., New York, N. Y. 10003. 1965. Pp. 226. Illus. $3.95. The purpose of this book is to provide an aid to the identification of particular weeds of the areas indicated in the title rapidly. The key is followed by the description of 365 weeds under common and scientific names. Highly recommended.

CREATIVE DECORATIONS WITH DRIED FLOWERS, by Dorothea S. Thompson. Hearthside Press, 381 Park Av. S., New York, N. Y. 10016. 1965. Pp. 125. Illus. $6.95. In this book the silica-gel method of drying flowers is explained, and its application in creating designs is discussed. Highly recommended to all who are interested in flower arranging.

FLOWER ARRANGEMENT WITH ANTIQUES, by Beth Hemingway. Hearthside Press, 381 Park Av. S., New York, N. Y. 10016. 1965. Pp. 191. Illus. $5.95. The purpose of this beautifully illustrated book is to "give both the flower arranger and the collector a simple and lucid account of the ways by which one art can enrich the other." The topics included are basic arrangements; arrangements for the living room, library, dining room. and other places and occasions. Highly recommended.

THE NEW BOOK OF FOLIAGE ARRANGEMENTS, by Emma H. Cyphers. Hearthside Press, 381 Park Av., S., New York, N. Y. 10016. 1965. Pp. 152. Illus. $4.95. This revised and enlarged edition of a standard text on foliage arrangements by an authority brings the subject up-to-date. It is recommended to all who are interested in flower arranging.

THE ROSE QUESTION AND ANSWER BOOK, by John Milton. Hearthside Press, 381 Park Av. S., New York, N. Y. 10016. 1965. Pp. 192. $3.95. This book, by an authority on roses, is concerned with the problems commonly met with by the rose gardeners. It is arranged on the questions and answers plan. The subject matter includes kinds, culture, insect and disease control, roses in garden design, hybridization, etc. Recommended to all interested in rose growing.

HOME AND GARDEN CALENDAR, 1966. Hearthside Press, 381 Park Av. S., New York, N. Y. 10016. Paper with plastic rings. Illus. $1.50. The Federated Garden Clubs of New York State sponsor an annual flower arrangements calendar contest. In this little book, some of the outstanding photographs of floral arrangements accepted are reproduced in calendar form for 1966. The calendar will interest those engaged in flower arranging.

THE AFRICAN VIOLET CALENDAR, 1966. Hearthside Press, 381 Park Av. S., New York, N. Y. 10016. 1965. Paper with plastic rings. Illus. $1.50. The publishers sponsor an annual African Violet Arrangements Calendar contest, including also Gloxinias and other gesneriads. In this little book, some of the outstanding photographs of arrangements accepted are reproduced in Calendar form for 1966. This calendar will interest those engaged in flower arranging.

FERNS OF THE SOUTHEASTERN STATES, by John Kunkel Small. Reprint of the 1938 text. Hafner Publ. Co., 31 E. 10th St., New York, N. Y. 10003. 1964. Pp. 517. Illus. $10.00. Those interested in ferns will be grateful for this fine reprint of Small's 1938 text which has long been out of print. This includes a brief appreciation by Dr. Hume of Dr. Small who died in 1938. After an introduction giving the author's outlook on the grouping of the ferns and fern allies, and plant provinces of the Southeastern United States, there follows a key to the orders, families and genera for students; the description of 189 ferns and fern allies; the general and restricted distribution of the species; taxonomic lists, with citations; list of authorities cited; a glossary. and an index. This book is indispensable to those interested in the ferns and fern allies.

PLANT LIFE LIBRARY—continued on page (vi).

# THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

## I. THE AMERICAN AMARYLLIS SOCIETY

[A Committee of the American Plant Life Society]

[AMERICAN AMARYLLIS SOCIETY, continued from page 2.]

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Mr. Edward F. Authement, Registrar, 2214 Gallier St., New Orleans 17, La.

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Correspondence about the registration of plant names should be sent directly to Mr. Authement, and a self-addressed, stamped envelope should be enclosed if a reply is expected.

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*Examinations.*—Those desiring to take the examination for the Official Amaryllis Judges Certificate, should preferably apply to the Official Instructor for details. See Plant Life Vol. 17, 1961, pages 30—34, for further details.

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## III. PUBLICATIONS OF THE AMERICAN PLANT LIFE SOCIETY

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1. **AMARYLLIDACEAE: TRIBE AMARYLLEAE,** by Traub & Moldenke (including the genera Amaryllis, Lycoris, Worsleya, Lepidopharynx, Placea, Griffinia, and Ungernia; Manila covers; 194 pages, incl. 18 illustrations. $5.00 postpaid.

This is required reading for every amaryllid enthusiast.

2. **DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893—1948,** by Norton, Stuntz, and Ballard. A total of 2695 Hemerocallis clones are included and also an interesting foreword, and explanatory section about naming daylilies. Manila covers; 100 pages (1—X; 1—90), includes a portrait of George Yeld. $5.00 postpaid.

**3. THE GENERA OF AMARYLLIDACEAE,** by Hamilton P. Traub. Includes a general introduction, a key to the subfamilies, infrafamilies, tribes, subtribes and genera of the Amaryllidaceae, and descriptions of all the genera. Every member of the Society should have this book for constant reference. Manila covers; publ. 1963; 85 pages. $5.00 postpaid.

**4. LINEAGICS,** Hamilton P. Traub, This is the first outline text for the undergraduate student on the grouping of organisms into lineages. The text is divided into four parts: (a) the history of lineagics and lineagics as an integrated science; (b) basic lineagics, principles and procedures; (c) applied lineagics, principles and procedures; and (d) research methods in lineagics. Recommended for the student in biology. Publ. 1964. Manila covers, 163 pages, incl. 8 illus. $5.00 postpaid.

## PERIODICALS

**(A) HERBERTIA [First series,** 1934 to 1948, incl.], devoted exclusively to the amaryllids (Amaryllidaceae), and the workers concerned in their advancement. A complete set of these volumes is indispensable to all who are interested in the amaryllids. Libraries should note that this may be the last opportunity for complete sets.

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**(B) PLANT LIFE,** including numbers on various plant subjects, 1945 to date, and the **Second Series** of **HERBERTIA,** 1949 to date. It should be noted that the numbers of **HERBERTIA** of the **second series,** beginning in 1949, are in every way equivalent to those of the first series, and are devoted exclusively to the amaryllids.

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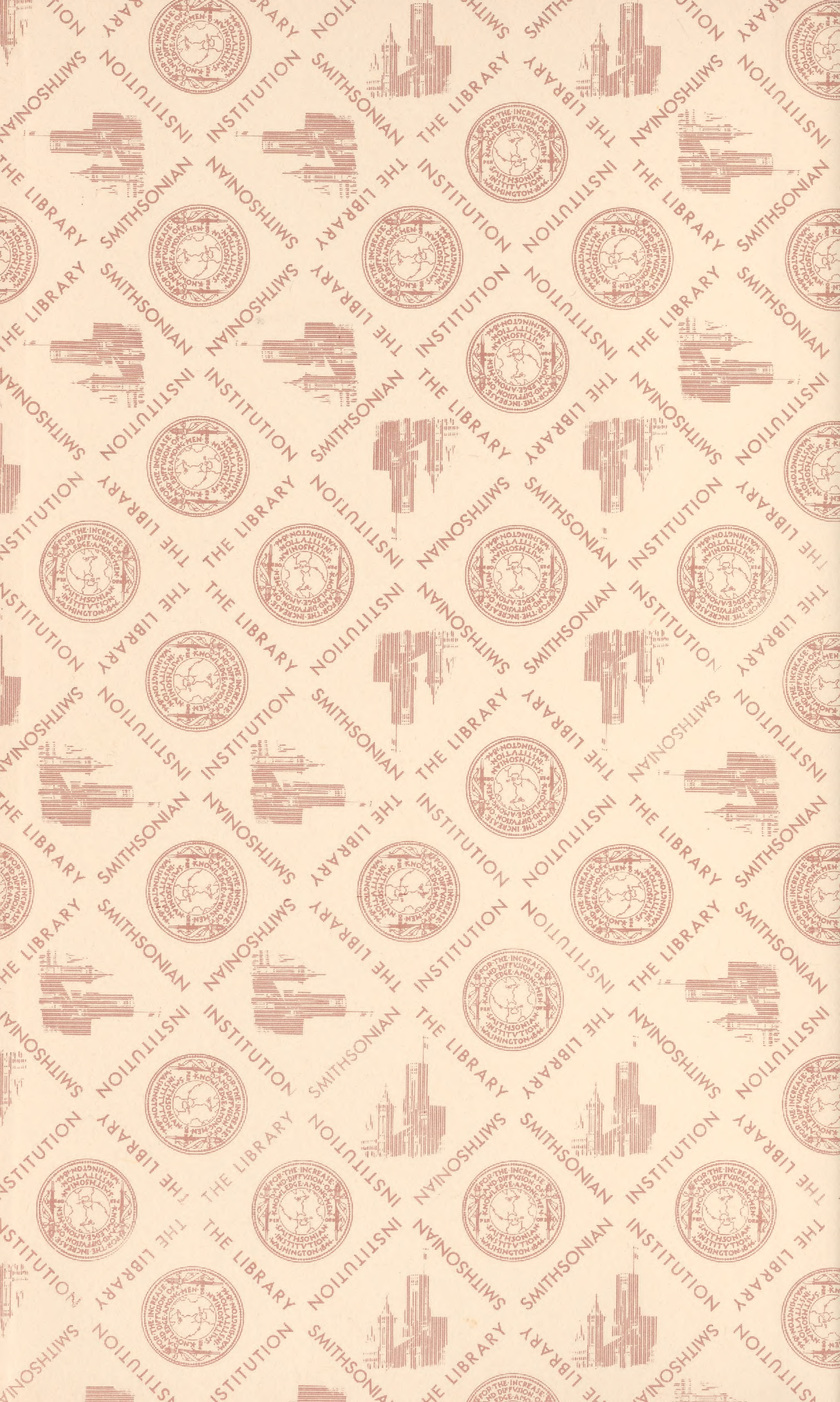
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